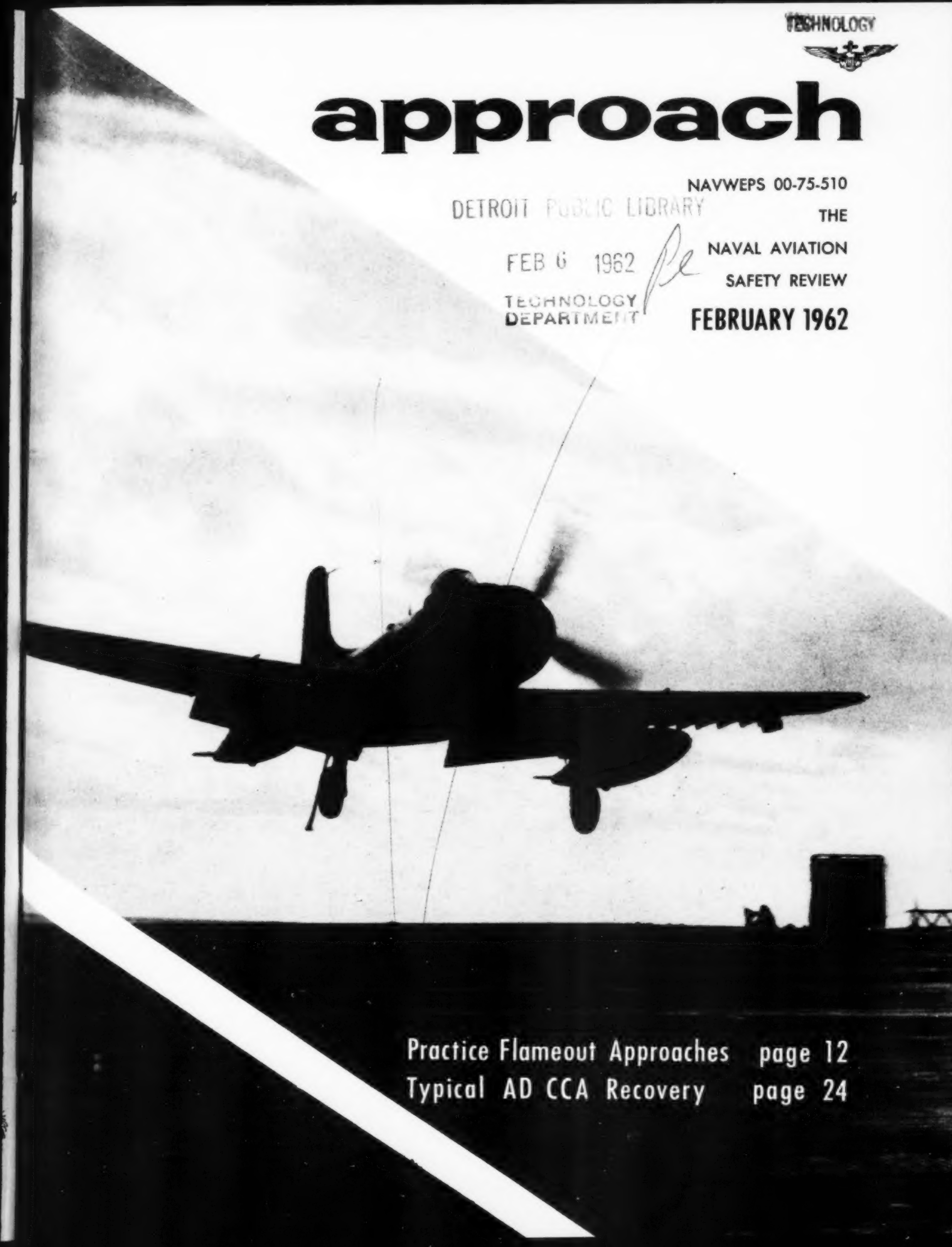
TECHNOLOGY

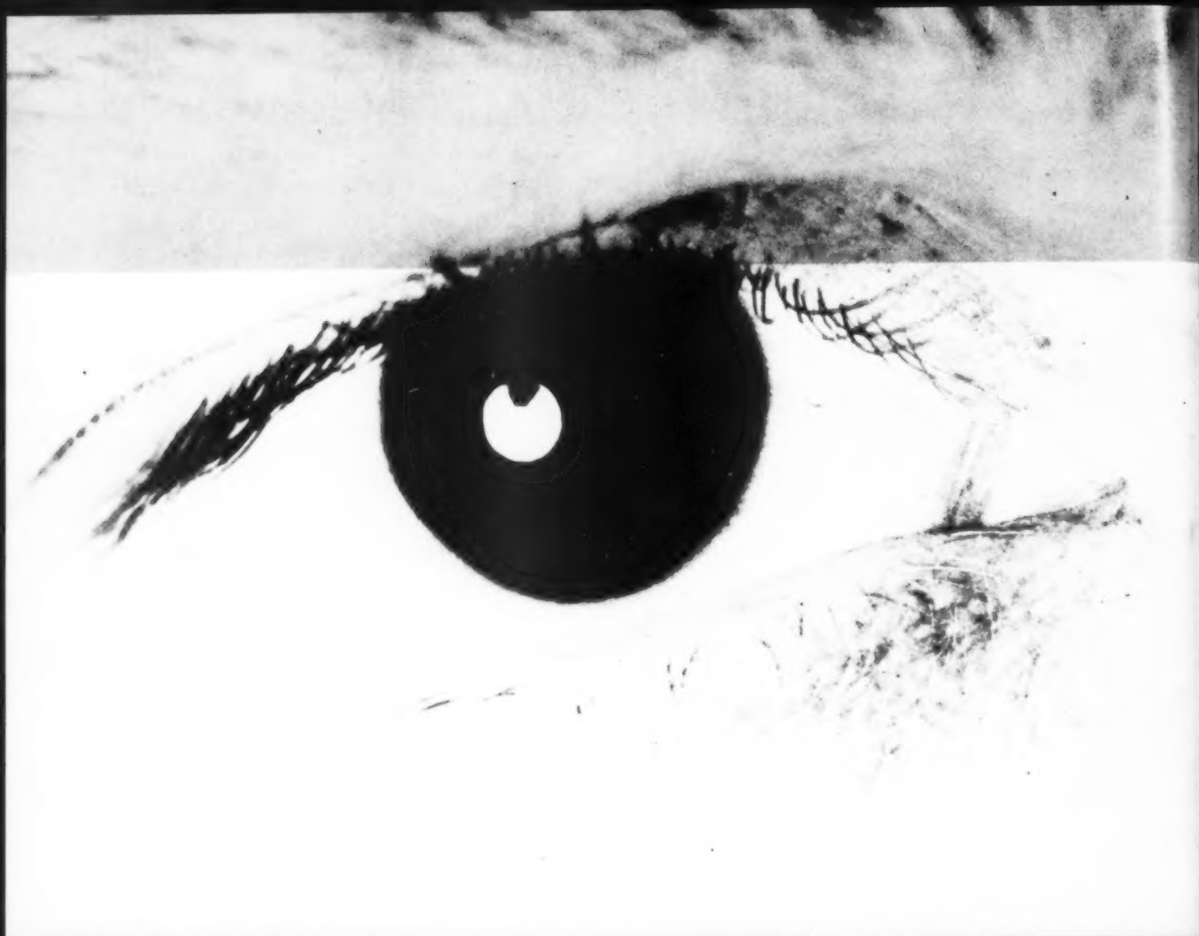
approach

NAVWEPS 00-75-510

THE NAVAL AVIATION SAFETY REVIEW

FEBRUARY 1962





how to cope with aviation vision problems

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Just a See Story

The human eye is primarily an "earth eye." Whatever success man has in coping with vision problems in aerial flight depends largely upon his ability to compensate for his personal design (Mk I, Mod O) and upon his ingenuity in reproducing his earth environment in his aircraft.

On earth, reduced or impaired vision can sometimes be dangerous depending on where you are and what you're doing. In aviation it constitutes an ever-present threat to life itself.

No matter where you are a number of factors can affect your vision physiologically—*hypoxia, carbon monoxide, alcohol, drugs, fatigue and even bright sunlight.*

On the other hand several vision-disturbing elements prevalent in aviation are encountered infrequently on earth. Among these are shock waves, vibrations, acceleration and a condition called empty field myopia which can result when there is no horizon or object visible for the eye to focus on. And, finally the visual effects of explosive decompression and hypoxia are so rare on earth as to be considered almost exclusively problems of aviation.

Oxygen the Bug.

Most of the physiological problems of vision in aviation stem from the fact that the eye's efficiency depends on a good supply of oxygen. When your oxygen supply fails, your vision is affected earlier and more severely than any of your other senses. That is why dimming and blurring of vision is one of the first symptoms of hypoxia.

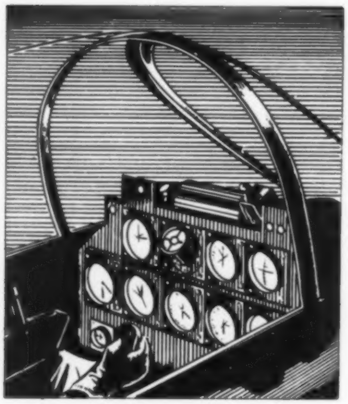
How does this happen? Blood is the body's oxygen carrier, and consequently, any disturbance of your circulation affects your oxygen supply. When your oxygen is cut down, side vision goes first because circulation in that area of the eye is less efficient than circulation in the center. This makes you feel as if you are looking at the world through a pair of shotgun barrels—tunnel vision, aviators

and flight surgeons call it.

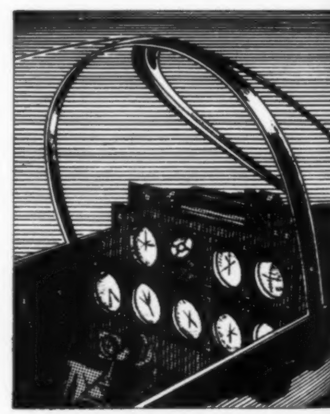
You will remember from your physiology lectures that, generally speaking, rod or night vision cells are located principally around the edge of the retina whereas cones in the center handle day vision. Because the rods are in an area of poorer blood circulation, oxygen is absolutely vital for maximum night vision. At 12,000 feet when you are breathing atmospheric air without supplemental oxygen, your night vision is only about half as good as it is at sea level.

Dysbarism Disturbances

Dysbarism (a medical term covering all physiological effects of decreased atmospheric pressure at altitude, except hypoxia) can result from explosive decompression or from loss of cockpit or cabin pressurization. You get visual disturbances with dsybarism when nitrogen bubbles forming in your blood are small enough to circulate through your brain and eyes. Your vision can become hazy and narrowed and blind spots with sparking edges can occur.



Instrument panel
as pilot sees it with night-adapted
eyes on the ground.

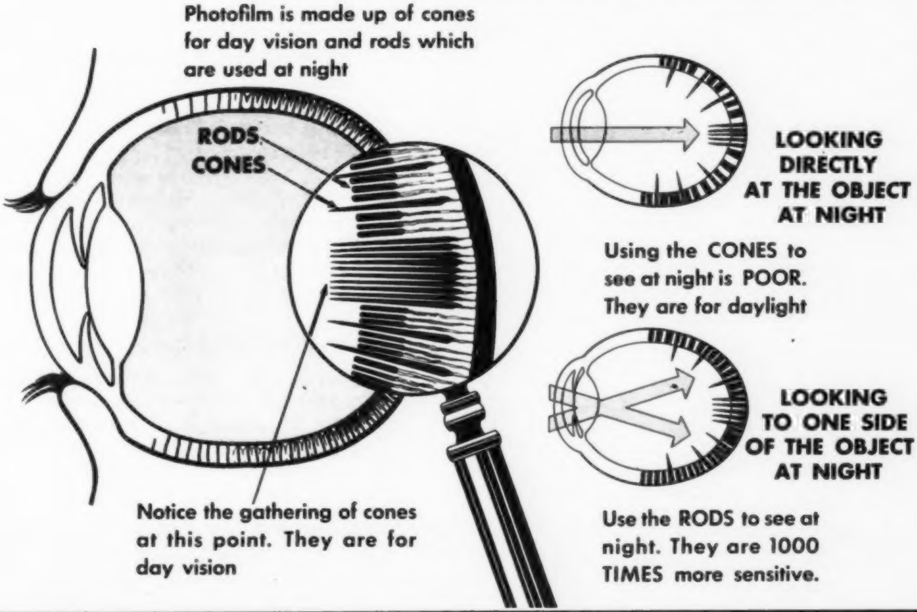


Same panel
as the pilot sees it without oxygen
at night at 12,000 feet.

As pilot sees it without oxygen
(though he may not realize it)
at 16,000 feet.

NIGHT VISION . . .

photofilm at the back of your eye



The pilot and crewman's best precaution against dysbarism is to breathe 100% oxygen on the ground for 15 minutes before takeoff. This reduces the nitrogen content of your blood and tissues.

Effects of Smoking and Drinking

Your eyes' dependency on a good oxygen supply explains the adverse effect carbon monoxide has on vision. As a TV huckster might put it, blood likes carbon monoxide 210 times better than oxygen. Carbon monoxide in your blood means less oxygen for your eyes. Thus smoking produces effects similar to those of hypoxia.

Carbon monoxide's effects are cumulative and it leaves your blood very slowly. About half of it will still be present at the end of 24 hours. As far as night vision is concerned, three cigarets equal more than 7,000 feet of altitude and it takes more than 15 minutes of breathing pure oxygen to recover the sensitivity lost.

Alcohol in your blood makes your body tissues less receptive to oxygen, decreases depth perception and to some extent shrinks the visual field. In addition, by reducing your coordination and your ability to think clearly, it makes you more likely to make mistakes about things you see and increases your reaction time.

If you are fatigued, your eyes are affected first and night vision is affected more than day vision. As everybody knows, fatigue makes it hard to focus your eyes and to keep them open. This can cause you to misjudge perspective patterns. Add a prolonged reaction time and a critical situation during approach and landing and you have troubles.

Rod Fatigue—Night and Day Aspects

Separate from the problem of general body fatigue and vision is what the docs call rod fatigue. In a prolonged visual search at night, temporary fatigue of the rods can occur. When this happens, you have periods of decreased sensitivity, lasting from a few seconds to more than a minute, in which objects seen earlier become invisible. *Regular scanning done in short jumps helps compensate for this.*

Intense sunlight can reduce your dark adaptation and night vision for several days. Bright sunlight

bleaches the photochemical substance in your rods. If you are on call for night flying or flight deck work, wear your sunglasses while you are out in the sun.

People's ability to see in dim light varies. (This may be why that jaygee beat you to the empty seat next to that goodlooking brunette at the movies last week.) Persons with the best night vision require only one-tenth the illumination needed under the same circumstances by those with the poorest night vision. In fact, under ideal atmospheric conditions, the completely dark-adapted eye can detect the flare of a match 25 miles away. Most of us can increase, even double our ability to see at night by making use of off-center vision. As we mentioned earlier, the center of the eye lacks rods, the night vision cells. Consequently, when you stare straight at something at night you can't see it. When you look to the side of the object, you can see it.

Adapting to Darkness

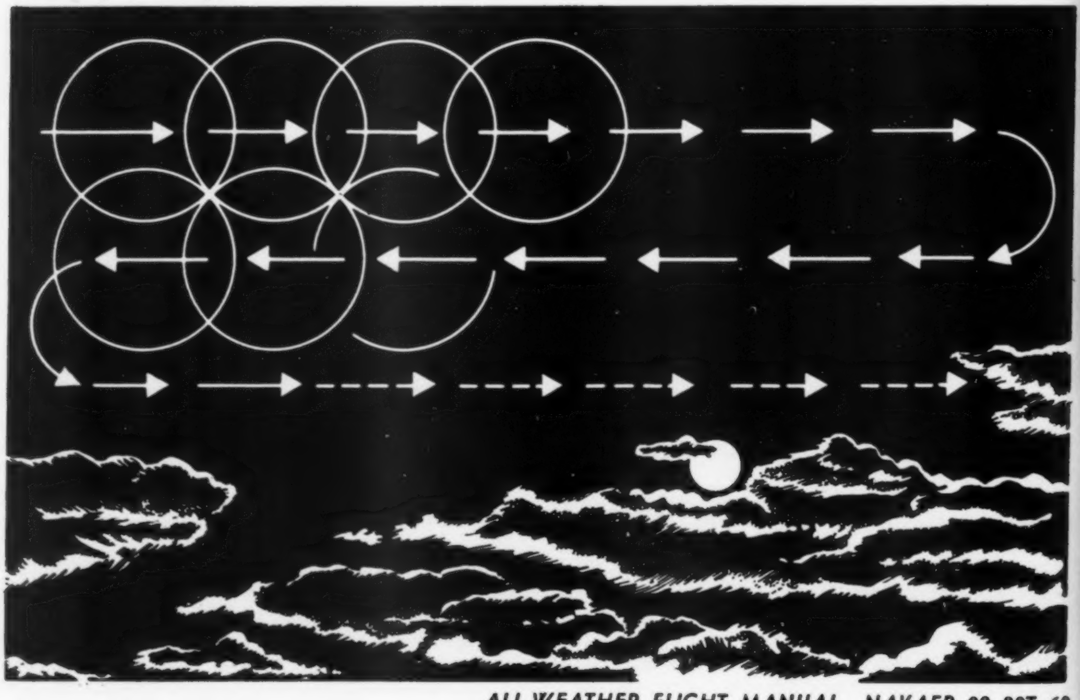
Ideally, the best procedure for dark adaptation is to sit in total darkness for a half-hour. However, a 30-minute period in red goggles in a dimly lighted room is more practical from your standpoint and will start you on your night flight with your night vision sharpened up. Even when wearing red goggles, you should avoid bright lights. And once you are dark-adapted, be careful about searchlights on deck and solicitous line crewmen who shine flashlights in your eyes just before takeoff. A strong light striking your eyes can ruin your vision for several minutes and it will be at least a half-hour before your eyes return to peak efficiency.

The fact that *dark adaptation is an independent process in each eye can help you* if you are caught in a searchlight beam or must use white light for some purpose in the cockpit. Close or cover one of your eyes and you will save half of your night vision. If you should have any peculiar visual sensations when you reopen your dark-adapted eye, close the unadapted eye.

Speed—Scan—Midair—Scan

A number of visual problems are peculiar to near and supersonic speed. Time-distance relationship, compression waves and acceleration can cause visual difficulties.

Scanning Technique



ALL-WEATHER FLIGHT MANUAL NAVAER 00-80T-60

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Everybody is aware of the danger of the time-distance relationship in high speed aircraft. The trouble is simply that no one can see, identify or act on an object the instant it comes into his field of view. Each of these processes takes time—not much, but seconds are worth hundreds or thousands of feet in a high speed plane.

To help prevent midair collisions it is essential that pilots and air crews scan the sky continually in flight. Since the eye sees poorly during movement of the image across the retina, *maximum effectiveness in scanning is achieved by a series of short, regularly-spaced eye movements* such as would systematically cover every 5 to 10 degree area with a 1-second look. Scanning patterns should be worked out for specific positions in each type of aircraft so as to leave no area of the sky unsearched.

How to Scan

When scanning, you should move your head along with your eyes. Each eye has a blind spot, toward your nose and down a bit, where the nerve pathways leave to form the optic nerve. If you move your head along with your eyes, the sensitive part of one eye covers the blind spot in the other eye. This is why you are never conscious of these blind spots. (See chart.) If you keep your head in one position and simply move your eyes to scan, objects such as the windscreen frame can block out the vision in one eye while the very thing you are looking for is in the blind spot of your other eye. Result—you don't see it at all.

Shock Waves, Vibrations and G-Effects

Shock waves are a special problem of high speed flight. The optical effect of shock waves (and of heat waves, as well) is an apparent displacement of objects from their true position. While this can occur at speeds of Mach 1 to Mach 4 it is apparently seldom experienced.

Vibration

Vibration can cause annoying though transient blurring of your vision. A certain amount of vibration is inevitable in all kinds of aircraft—in reciprocating aircraft, in jets when buffeting occurs (including buffeting in certain aircraft at transonic speeds) and in helicopters. The operational difficulties resulting from the effects of vibration on vision can be reduced by proper design of instruments and of the printed materials which have to be used. This is particularly important for night flying. However, vibration does not cause any known eye injury.

Streamer Pattern in Vision

Movies made of the eyes of a person driving a car . . . show that as speed picks up, the eye moves less and less. The eye need not sweep the scene, because the scene sweeps the eye. From a moving car, everything moves in a fashion which E. S. Calvert, a British scientist, calls the "streamer pattern." For example, a tree on the right-hand side of the road ahead of you first starts drifting a little to the right, then gets bigger and starts moving, and finally hurtles by. The same on the left. The only place that doesn't move is straight ahead, the bulls-eye. That only gets bigger.

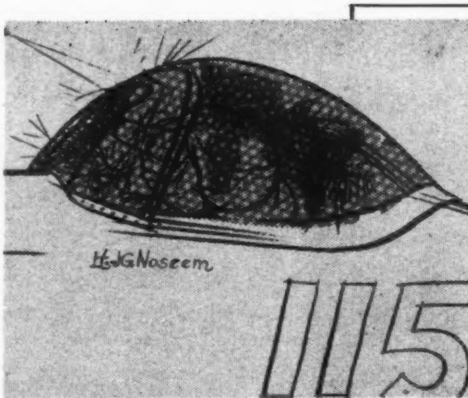
Calvert says we sense our motion not straight ahead, where we are looking, but out on the right and left where we are *not* looking. We do our driving with the corners of our eyes. The streamer pattern is more lively there. Cut off that part of the driver's vision, and he becomes uncertain.

Calvert used this knowledge in designing the lighting system for London Airport. Pilots have been complaining for years that the approach lane and runway are poorly marked at most airports. Calvert, at London Airport, put additional lights way out to the right and left of the pilot's path, *out of his direct vision.* It did the trick. London is now considered by many pilots the world's best bad-weather airport.

—Wolfgang Langewiesche
"You Can Learn to See More"
Reader's Digest, June, 1957

Autokinesis

Autokinesis—the apparent spontaneous movement of a pinpoint stationary light in darkness when other visual references are inadequate or absent—is a visual illusion which can occur in night flight. Autokinetic movements of your eyes will cause the point of light to appear to move from side to side or swing in wide arcs. Sometimes there even seems to be a contraction or expansion of light when in reality the light is approaching or going away. You can minimize this autokinetic effect by not staring at the point of light, by having as many other visible objects in view as you can and by being very suspicious of sudden irrational movements of the light.



Why are red instrument lights used on night flights?

On night flights, red light is the best bargain on the instrument panel because it can be seen by the cones in your retina but not by the rods. It is important for you to preserve the dark-adaption of your rods, but it is also important for you to be able to use your cones to distinguish the detail on the instrument panel. Red instrument lights allow you to do both because your rods and cones respond differently to different wave lengths of light. The cones are more sensitive at the red end of the spectrum.

NAVEXOS P-960

Problems Beyond Control

There are a number of vision problems whose causes are beyond the "viewer's" control. These are chiefly matters of weather and terrain, light and atmosphere and aircraft design.

When you cannot see the horizon and there are no clouds, you can experience a visual condition which flight surgeons call empty field myopia. Without any objects to focus on, your eye focuses at 3½'. This kind of nearsightedness can also occur in total darkness, in fog, or when there is a uniformly overcast day. In air-to-air search, a pilot or crewman experiencing empty field myopia is to all practical purposes blind to objects out in space. Frequent shifting of gaze to objects inside the cockpit or to objects outside such as wing tips exercises the eyes and counteracts this condition somewhat.

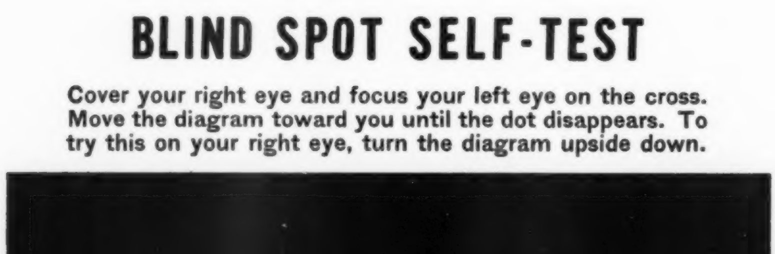
G-Forces

Acceleration which reduces blood circulation to the eye and brain can lead to greyout, blackout, and tunnel vision. Time of exposure and direction and amount of force of acceleration are governing factors. In greyout, peripheral vision is lost and central vision greys; it is produced in general under a force of 3.5 to 4.0 G. Blackout, a total loss of vision, may occur at from 4.0 to 4.5 G. Acceleration from 3 to 7 G can produce tunnel vision such as is caused by hypoxia. Redout occurs under conditions of negative G but medical authorities are not in agreement as to its exact cause.

Fortunately, recovery from visual symptoms of acceleration is rapid—from 2 to 3 seconds. Properly worn and used the anti-g suit counteracts acceleration-caused visual difficulties to a limited extent.

BLIND SPOT SELF-TEST

Cover your right eye and focus your left eye on the cross. Move the diagram toward you until the dot disappears. To try this on your right eye, turn the diagram upside down.



Depth Perception Aspects

Loss of depth perception can result from loss of vertical visual clues especially at night and over smooth water and snow-covered fields. Your landing difficulties in such situations can be compounded by conflicting visual clues. These may be a second runway at 45 degrees near the start of the approach runway, structures below the level of approach, rows of alternating bright and dim lights and lack of a visual frame of reference from lights alone. Spatial disorientation can result when one visual image prevails or two images alternate and you are unable to form a unified mental image of the landing area. To some extent, landing field design and proper lighting can alleviate these conditions.

Windshield Distortions

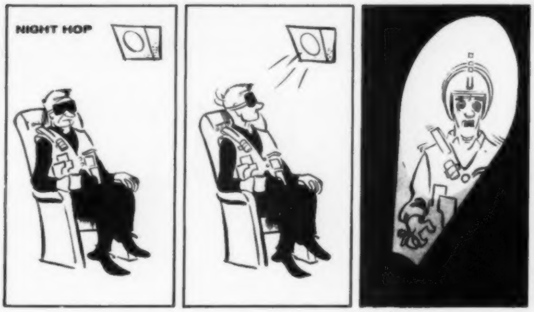
All pilots and crewmen are familiar with the problems associated with aircraft canopies and windshields. Somebody has said that the perfect windshield or canopy is easy to describe and nearly impossible to achieve. It should be completely transparent, offer no obstruction or distortion to your field of view and should be strong enough to withstand any stress imposed on it. It should not ice over and it should shed rain. Practical considerations in manufacturing are something else again. Distortion and refraction in bent or curved glass and plexiglass, reflection of objects and areas within the cockpit and aerodynamic design considerations all work against achieving the perfect windshield or canopy.

Eye Sees in Movement

When you look at something you don't stare. The eye is sweeping, scanning all the time, much as a man might shine a flashlight around a strange garden, lighting up object after object. The eye takes 10 separate looks a second; the mind pulls them together into a picture. These movements of the eye are very small, very quick, like vibrations. If looking made a noise, it would be a buzz.

This rapid wiggling is necessary because of the way nerves work. Every impression wears off. You don't hear a steady noise, but you wake up when it stops. Change is what we notice. If you stare at one point long enough, you quit seeing it. To see well, the eye must keep moving.

—*Wolfgang Langewiesche*
"You Can Learn to See More"
Reader's Digest, June 1957



"Your plane is ready, sir!"

About the only thing you as a pilot or crewman can do to help yourself as far as vision through windshields and canopies goes is to insist on clean, unscratched surfaces—and, incidentally, on clean unscratched helmet visors and goggles. Many persons fail to realize how much a dirty windshield can reduce light entering the cockpit. Scratches, dirt, dust and small insects stuck on a windshield break up light as it enters. This is not only uncomfortable and annoying but is a source of eyestrain. It can be an even more serious hazard to vision at night.

Glare is an ever-present problem in aviation although sunglasses and tinted visors help some. When glare is the result of a bright sky and a dark cockpit, turning up the instrument lighting helps. For helmet wearing types, the old problem of light leakage and glare between oxygen mask and APH-5 helmet visor has been alleviated somewhat by modifications described in ACSEB 35-60 of 15 September 1960.

You should know the limits of your eyes under various conditions, for seeing is a mental as well as physical process and can be improved by continued conscious mental conditioning. ●

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LETTERS TO THE EDITOR

Mfr. Interest

Johnson City, N.Y.—I am very interested in being placed on the regular mailing list for APPROACH. In view of the fact that we are actively engaged in the design and manufacture of flight controls for such naval aircraft as the F4H, your magazine would be of substantial interest to personnel in our organization.

A. R. ADLER
Reliability & Maint. G.E.Co.

Final Honk

NAS Alameda—As I prepare for retirement which . . . , I wish to thank the following persons, organizations, and publications for keeping me alive—

a. The Safety Center—for bits of sound safety dope that caused me to think before each flight.

b. The many mechanics, electricians, radiomen, weather guessers and linemen who have made my life easier and safer by their attentiveness to duty.

c. The FAA—for looking after me when I was sure I was lost.

d. The tower operators who considered my low fuel state and got me safely on the deck (500 pounds remaining—I thought).

e. For the chewing out by operations officers when my "hindsight was better than my foresight."

f. To line crews across this nation who made my stops and stays pleasant and easy—and for servicing my aircraft in inclement weather.

g. To other pilots whose experiences have put the fear of God into me (I profit by their mistakes).

h. For safety devices and equipment which gave me a feeling of security and of knowing I had the best there was to survive.

i. To people who stood beside me when the going was tough.

j. To God Almighty for giving me the privilege of being a Naval aviator—the finest bunch of men in the world today.

Without the aforementioned, I would have been "nothing."

WAYNE (THE HONKER) SAGOR, LCDR
Flight Test (402)
NAS, Alameda, Calif.

Stoof 'Scape

FPO San Francisco—VS-23 has developed a unique survival training test for its pilots. When a replacement of a side window is required in the S2F, due to excessive crazing or other conditions making it no longer of use, the following method is employed.

A pilot is strapped into the seat on the side of the window to be replaced. The situation simulated is that the aircraft has ditched and all normal exits of escape are blocked. Upon a "go" signal, he must remove his survival knife and create an exit for himself through the window.

LT D. E. Kentopp, the first pilot to try the operation, made good his escape in 50 seconds. Any challengers to this record?

R. E. SEAMAN, LT
Aviation Safety Officer

Facilities Interest

New Orleans—It is requested that the District Public Works Office, Eighth Naval District, he placed on your official distribution list to receive the magazine APPROACH.

Since we administer the construction and Architectural-Engineering contracts for and provide technical advice to the naval air facilities in this district, we have a great interest in the contents of your magazine.

W. E. DOUGLAS, JR.

For Single Type Screw

NAS Jacksonville—After reading Lt. Osterberg's letter, "Writer's Cramp," Sept. 61 APPROACH, I imagine this is just one of many comments of agreement or disagreement—I agree with Lt. Osterberg.

His letter prompted me to write about an idea that I've had for many years—which is along the same line as your article, "Access Panel Screws," Page 42, of the same issue.

Why does the Navy keep using "Phillips" and "Reed and Prince" screws? This is just asking for trouble. Neither screw has any advantage or disadvantage over the other that I can see. But when an aircraft has both type screws installed, especially on the *same* access panel, it's nothing but a disadvantage.

A fairly decent tool box for a structural mechanic should contain (for recessed screws) a stubby, 3-inch, 4-inch, 6-inch, and offset screwdriver—five screwdrivers in all—plus several bits (tips) of the type screws. By using Phillips and R & P screws, that makes *ten* screwdrivers and quite a few bits (tips) in each box.

By eliminating one or the other type screws, the Navy could eliminate one-half of the screwdrivers purchased each year. The savings on this could only be estimated by finding out how many screwdrivers are purchased each year for each type.

To go a bit further—we could say that the Navy could eliminate *more* than one-half of the screwdrivers purchased each year, because with just one type screw head, there would be no more using the wrong type screwdriver for installing or removing screws. This saving would be hard to estimate accurately—but a conservative estimate would be that at least 50% of all damage to recessed screwdrivers is caused by using them on the wrong type screws.

So much for the screwdrivers—how about the screws? Many pages could be torn out of the FSC 5305 catalogue with the elimination of one or the other screws.

There was some mighty good dope in the "Access Panel Screws" article, but the best procedure that I have found for removing recessed screws was not mentioned—"Hand Impact Wrenches." That is the handiest tool in any mechanic's tool box—either $\frac{1}{4}$" or $\frac{3}{8}$" drive. By using a copper faced hammer (to prevent bounce and the added weight advantage) and a hand im-

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

pact wrench with the proper bit and holder, each screw can be broken loose, then removed quickly and easily with a speed handle or pneumatic nutrunner. I used, and saw used, this procedure on the old Banshee 2 fuel cell covers for over nine years and that is a good many screws.

I have yet to find anyone in disagreement with the "One Type Recessed Screw" idea. Are we to be discouraged from offering money-saving, time-saving and safety ideas????

R. A. GRIES, AMCM, VA-44

Inspector or Maintenance Supervisor?

Shearwater, Nova Scotia, Canada—The item "Quality Control-Lacking" on page 45 of Sept 1961 issue of APPROACH raises several questions in my mind as one who is trying to establish the proper place of Q.C. in the maintenance field.

It has been suggested that the references to "Q.C. Inspectors" should in reality read "maintenance supervisors," and that it is a misnomer to call this function "Quality Control."

If the suggestion is borne out, it would indeed be a pity considering the degree of misunderstanding that already exists over the functions of the Q.C. On the other hand, if Q.C. does have a practical working base in USN squadrons and O & R facilities, and is classified as non-restricted information, I would be most interested in receiving relative info from any of your Q.C. readers.

T. J. IRELAND

● Q.C. is still in its infancy as it concerns standardization among USN squadrons. April 1961 issue of APPROACH sheds more light on the concept and philosophy of several units. Subsequent issues reflect additional experiences. Eventually, we hope, developments will bring Q.C. into its proper perspective among all units.

Rout FOD, Reduce Blast

Cecil Field—The problems of jet engine foreign object damage and jet blast hazards to maintenance personnel have been recently augmented here by the presence of more aircraft and squadrons than at any time in the station's history.

The high power requirements for taxiing and turning the A4D in close proximity to other activities has introduced a genuine headache to many already feverish Maintenance and Safety Officers.

VA-36 has undertaken positive steps in reducing jetblast danger to airplanes and airmen by devising a unique method of taxiing and parking their aircraft in the overcrowded ramp area.

First, each airplane's parked position was rotated 90 degrees, thus directing the jet blast away from the intakes of nearby aircraft, shop spaces, and unsurfaced areas behind the hangar.

As it is not equipped with a steerable nosewheel, the A4D must necessarily use brakes accompanied by debris-scattering high power settings in order to negotiate a turn while taxiing slowly. Borrowing a familiar ship-board technique, the *Roadrunners* next introduced the nose wheel steering bar to guide the *Skyhawk* to the safety inspector's position which is clear.

The steering bar is then detached and the inspector checks the airplane for loose fuel caps, access plates, and all other danger areas. When the aircraft returns, the pilot makes a 45-degree turn into the parking space with only idle power.

The system's merit has been borne out by a considerably reduced FOD

Navigation Assist

Travis AFB—To those air travelers who have stopped at Midway Island in the Pacific the Gooney Bird, or Midway Albatross is a familiar sight.

What they might not know is that MATS navigators have for years used this bird as a valuable aid to navigation. The utilization of this natural resource is based on the uncanny ability of the Gooney Bird to return to Midway even when released from a point thousands of miles away. Veteran navigators are aware of this unerring capability and rely on it much more than they do the newer aids such as Loran, Celestial and Dead Reckoning.

To effectively utilize this aid the aircraft must be modified in such a way that there is a cage installed beneath the navigator's table that is large enough to contain the Gooney Bird and allow him to move around unhampered. The top of this cage which is the floor of the navigator's compartment is made of heavy plexiglass with etched lines running parallel to the longitudinal axis of the aircraft. As part of his preflight duties prior to departing Tokyo the crew navigator checks out his Albatross from the Flight Planning Section. He paints an arrow on the bird's back terminating on the bird's head and installs him in the cage beneath his desk. When the pilot calls for a heading after becoming airborne the navigator merely stamps on the floor of his compartment which puts his bird into flight. The Gooney will naturally set sail for Midway and at this point the navigator needs only to give the pilot a heading correction which will align the aircraft with the arrow on the back of his bird. Once on course the navigator only needs to make an hourly check to ascertain that the aircraft is correctly aligned with the GBLL (Gooney Bird Lubber Line).

JAMES W. FAIRCLOTH, JR.
Captain, USAF, 84 ATS

● We tried your system—and you are absolutely correct—the Gooney Bird headed straight for Midway—unfortunately, our planned destination was Bermuda.—Editor

From the "Interceptor"

'Scape Note

Ent AFB, Colo.—Just a short note to thank you for your idea and help with our canopy escape problem. If it had not been for your short blurb in a past issue of APPROACH, we would never have been able to solve this problem.

The knife that we have perfected will be placed in every ADC interceptor before long. This will not only give us an escape capability, but will standardize the location of the illusive dinghy stabber.

If you desire specs, drawings, and other materials on this knife, please let us know. It works 100% better than the regular hunting knife.

JOHN E. LANE
Captain, USAF
Research Editor,
"Interceptor" Magazine

P.S. If you know the address of the officer who started all this, could you send him a copy of this month's "Interceptor?" I believe that he would enjoy it.

● Our records are somewhat obscure as to who first brought the canopy break-out technique to our attention but we feel that members of former ATU-213 and LT C. P. Anderson share the credit as being among the first. Interceptors are on the way. ●

Crash Crew: Selected Items From Aviation Safety Council Meetings

Crash Alarm

Following an aircraft accident, a critique was held regarding the functioning of the crash crews and crash alarm. It was noted that the crash alarm was not heard by some personnel having crash phones in their spaces. It was recommended that the crash alarm be sounded with short, intermittent rings so as to distinguish it from the telephone, and immediate action will be directed toward it.—*NAS, NY*

Clearing the Runway

The procedure as recommended by the Council and adopted by the Air Station is to clear the runway of aircraft after an arrestment, permit landing of low fuel aircraft unable to divert to another field and then cease operations until the arresting gear rerigging has been completed.—*Kaneohe Bay Area*

Rescue Instructions

The chairman of the Pilot and Operations Caused Accident Committee Meeting reported all of VP-50's aircraft have had rescue instructions painted on them in Japanese. VP-22 will do this upon their arrival.—*FAW-6*

Emergencies

Several emergencies in the traffic pattern have been close to being disastrous because of the delayed declarations. The sooner the tower is informed of the emergency situation and the nature of the emergency the better the station will be prepared on the field and air traffic can be adjusted accordingly. It is recognized that this is not always possible if the emergency does not occur until after the aircraft is in the traffic pattern. Where possible, however, the emergency should be made known to the tower upon initial contact.—*NAS Barber's Point*

Crash Crew Training

Various squadrons have offered their services in training the NAS Crash Crews. To date these services have not been utilized.

The Crash and Salvage Officer stated that he did not know that the service had been offered. When informed that squadrons would even tow a downed aircraft over to the crash and salvage crew to work with, so as not to take them off station, the Crash and Salvage Officer said that this would definitely be utilized. Also it was suggested that pictures be taken of the pertinent parts of aircraft to assist the salvage operations and that these pictures be marked and given to the Crash and Salvage Crew for study.—*Chesapeake Area*

In view of several recent successful flameout approaches and landings, particularly in the A4D, pilots are again raising the question of the advisability of practicing flameout landings in certain models.

PRACTICE FLAMEOUT APPROACHES?

THE philosophy for several years has been that it is practically impossible to make a successful landing in a flamed-out A4D and therefore why bother with practicing the approaches — if the engine flames out and relight efforts fail, maneuver the aircraft to a clear area and eject.

But suppose the flameout occurs over a densely populated area and there's a suitable landing field at hand?

The pilot is almost obligated to bring the aircraft down in a clear area and yet he has had no training for flameout landings. He's in a difficult situation.

Also, there are air bases that are sufficiently remote from densely populated areas to make flameout approaches possible without danger to life or property.

Finally, the RAPEC seat, now being installed in all A4Ds (and of course the Martin-Baker retro fit in many of our other first line aircraft) reduces the hazard to the pilot in the event a misjudged approach makes it necessary for him to eject.

For these reasons it seems wise to reexamine the current doctrine which advises ejection in the event of flameout over land.

A related emergency is the pilot with the malfunctioning engine. He, of course, should not waste time setting himself up for a full pattern precautionary approach. His goal is to get the aircraft on the deck as soon as possible. This could require anything from a straight-in approach to flying the last 180 degrees of a precautionary approach.

There are two schools of thought concerning this problem; one advocates making the approach so that any time the engine quits during the approach the pilot will have the speed, altitude and position necessary to land on the runway, and the other proposes that any time the engine quits during the approach the pilot will eject. *The first method should not be attempted by any pilot who is not currently proficient in the simulated flameout approach for the aircraft he is flying.* Because of

the current ban on this type training further discussion of the first method at this time will serve no useful purpose.

The second method requires that the approach be flown in such a manner that the pilot is exposed to marginal airspeed and altitude combinations for the shortest possible time. Until he reaches this danger area, a short distance from the end of the runway, he may safely eject. (See accompanying box with minimum ejection criteria.) After he passes through it he is in a position to land on the runway if the engine quits.

This involves flying the approach pattern *without ever reducing power below that point necessary to maintain straight and level flight in landing configuration.* Rate of descent and airspeed are controlled by use of flaps and speed brakes, and throttle is not reduced until the runway can be reached without power. Most squadrons have made some provisions in their doctrines for the precautionary approach; some adhere to the principles set forth above; others do not.

The following detailed procedures are currently in use by several A4D squadrons and have been carefully flight-tested. However, they are suggested procedures only and are not contained in the NATOPS manual. If squadrons desire to adopt it they may recommend its inclusion in NATOPS via established channels in accordance with OpNav Inst 3510.9.

In the meantime it should be noted that the Center *does not recommend private experimentation.*

The following RAPEC seat data correlates minimum ejection altitude with sink rate and allows for a 2-second reaction time which is considered to be the time the pilot decides to eject, pulls the curtain and commences the ejection cycle.

Sink Rate	Minimum Ejection Altitude	Airspeed
No sink rate	Zero feet	130 knots
3400 fpm	400 feet	130 knots
4000 fpm	500 feet	130 knots
5500 fpm	700 feet	130 knots
8000 fpm	1000 feet	130 knots

Procedure for A4D Precautionary Approach

1) Prior to takeoff, check gunsight for operation and 100 mm ring on horizon.

2) Set sight for 100 to 115 mm prior to entry to the landing pattern.

3) Initial point 5 miles out on TACAN or radar at 3000 feet. Drop gear, flaps and speed brakes, 150 to 160 knots. Use one-half flaps and speed brakes in to maintain level flight with 85 percent. Lock throttle at 85 percent until approaching runway.

4) At initial point set pipper (100-115 mm) on end or alongside landing end of runway. Hold it there and drive downhill.

(a) Rate of descent 1700-1800 fpm.

(b) Speed 155-160 knots stabilized.

5) If speed gets low due to flat approach caused by strong head wind, retract brakes and level out momentarily.

6) Just short of end of runway throttle to idle, flare and land. Speed will be 155-160 knots. Touchdown at 135-140 knots 750-800 feet past pipper aim point.

An emergency requiring a precautionary landing is one, above all others, for which the pilot must pre-plan. He does not have time for lengthy consideration; he must know what he is going to do before he ever climbs in the aircraft.

Adapted from 11-61 A4D Crossfeed.

Note: This material, while cleared with NATOPS, is advisory only. For latest information consult Crossfeed for your model aircraft, NATOPS revisions, etc. Additional related data will be published as soon as possible. ●

THE LATE WAVEOFF

> **"The physician can bury his mistakes, the architect can advise his client to plant vines, but the LSO *must* advise early waveoffs."**
>
> ***Adapted from wisdoms by Frank Lloyd Wright***

A TAIL hook pilot is faced with a serious problem when given a late waveoff by an LSO. From his first days of flying school a pilot is taught to respond almost automatically to a waveoff signal by adding power and easing back on the stick. An even more basic response to a waveoff or landing is to flare the aircraft because the landing surface appears larger as we near the touchdown point.

It is imperative that a pilot be aware of his natural response to a waveoff signal. The result of pulling back on the stick when near the stall angle of attack is a large increase in induced drag which can cause loss of lateral control and complete stall of the aircraft. Overrotation will also increase the probability of an inflight engagement of the arresting gear. An aircraft rotates about the center of gravity when its angle of attack is increased. Since the distance between the C.G. and the tailhook is considerable, any increase in pitch attitude during a late waveoff will cause a significant decrease in hook to ramp clearance. In most aircraft a five-degree increase in pitch attitude during a waveoff will decrease hook to ramp clearance approximately 1½ feet. A high sink rate and a decrease in hook to ramp clearance are perfect conditions for an inflight engagement.

A late waveoff from the carrier deck is normally given when a plane is either high or low at the ramp. When you are low at the ramp the LSO is making an outright attempt to save your life by waving you off. If you are high at the ramp some LSOs will wave you off for fear you will attempt to dive for the deck. A dive for the deck from a high at ramp position will cause an excessive sink rate and lack of control. Most assuredly we must learn to execute a safe late waveoff when flying jet aircraft near-stall angles-of-attack.

A carrier approach in a jet aircraft is made in the region of reverse command. In this flight condition it takes more power to fly slower. Swept-wing jets have wings of short span and a reasonably small area. Thus a carrier approach must be made at a high angle-of-attack in order to produce required lift. When lift is produced at high angles-of-attack a large amount of induced drag results. As the angle-of-attack increases toward stall, the induced drag effect skyrockets. At the stall the maximum amount of induced drag is being generated.

Along with the induced drag acting on the aircraft in slow speed flight, there is another form of drag in effect—parasite drag. This is referred to as "barn door" drag. The shape of the aircraft and its component parts in the wind stream cause this drag. Its effect at slow

by Lt Neil D. Gerl

IN JET AIRCRAFT

speeds is small and the pilot has no control over it in flight. However, the pilot can control the amount of induced drag acting on his aircraft by flying at the correct angle-of-attack for a particular flight condition.

The standard jet carrier approach today utilizes the mirror system glide slope. In making this approach the use of an angle-of-attack indicator adds immeasurably to the success of the approach, as a near steady state indicated angle-of-attack is required to remain on the glide slope. The control of rate of climb and descent is achieved by the power setting. Airspeed angle-of-attack is adjusted by raising or lowering the nose. If power setting is not changed and the angle-of-attack is increased, there will be a large power deficiency and loss of airspeed due to the increase of induced drag.

When a sweptwing aircraft is flying close to stalling speed the air flow begins to reverse on the wing. The aft edge of the wing, starting from the tip, will stall first because of this reverse air flow. This will cause lateral control to deteriorate as the control surfaces are near the wing tips and are affected by the reverse air flow. Reverse air flow on a wing decreases lift and increases sink rate.

Aircraft having rectangular or moderate taper wings will generally stall near the wing root first. Thus, the loss of lateral control is delayed. This phenomenon will lead to less dangerous stall characteristics than those found in sweptwing aircraft.

The correct procedures for executing a late waveoff in jet aircraft are very simple. Answer the waveoff signal with full power and retract the speed brakes if they are out. Don't panic and pull back on the stick. Fly the aircraft at the recommended approach angle-of-attack and no higher. Keep the wings level because any deflection of the lateral controls will increase drag and decrease lift. If the ailerons become marginal, lateral control can be maintained by coordinated use of the rudders. It takes about four seconds to accelerate most jet engines from approach power setting to full power. This increase in RPM will give about 50 percent increase in total thrust. At full power and the proper approach angle-of-attack the aircraft will quickly transition from descent to climb.

There is one more point to be considered. Induced drag can be reduced 50 percent by flying in ground effect. If your rate of descent carries you down near the water or land on a waveoff, there is still plenty of hope for recovery. When the aircraft is close to the surface the airflow over the wings is altered. There is less downward deflection of airflow since air velocities can no longer have a vertical component toward the deck. The result is a decrease in induced drag. With less total drag you will have a greater excess power factor to stop the rate of descent.

Although there is a correct technique for executing a late waveoff the best bet is to fly a centered meatball on the approach eliminating the necessity for a late waveoff. ●

By LCDR J. T. Gilstrap

UNHAPPY TURN

Chopper readers may or may not agree with LCDR Gilstrap's interesting discussion of tail rotor failure in flight. While the subject is somewhat controversial, the more thought provoking discussion there is on subjects such as these the more knowledge and understanding is gained. Although desirability of the "run on" type landing under certain circumstances as suggested by the author can't be ruled out, in general NASC prefers the final approach and landing to be in full autorotation. Incidentally, recommended Flight Manual changes on the subject are presently pending.

How to Train for Inflight Tail Rotor Failure

As the opinions fly thick and fast on the subject of "what to do in the event of a tail rotor failure," it is interesting to note that there is always someone to add fuel to the flame.

The number of helicopter pilots who guessed wrong when their helicopter became a misguided missile due to the loss of a tail rotor, are about in the 95 percentile. It's nice to be average, but it's a lot better to be right. The factors that present themselves when you and your tail rotor part company must be understood to be met with proper action.

Let's get fundamental—the whole purpose of the tail rotor is to compensate the torque in the engine-to-main-rotor couple. It provides control around the helo's vertical axis by creating thrust to the right in powered flight, proportional to the amount of left rudder being displaced and to the magnitude of the torque couple.

In the realm of unpowered flight (autorotation) the tail rotor creates thrust to the left, in proportion to the amount of right rudder applied beyond the position where the tail rotor creates zero thrust. It is recommended that these points be fully understood as the first step toward standardizing a safe and completely reliable procedure to be followed in the event of tail rotor failure.

The following items should be included in all transition/familiarization syllabi for single rotor helicopters.

1. Note the position of the rudder pedals while in a stabilized, straight-in autorotation at the normal recommended airspeed.

a. This rudder position *must* be slightly beyond the zero tail rotor thrust position in order to maintain balanced flight since the friction in the system tends to carry the fuselage around the vertical axis in the same direction as the rotor.

2. Place the rudder pedals in the position found in step one, while in fast cruise and observe the effects to the flight performance.

3. Gradually rotate the nose upward until airspeed stabilizes

at that recommended for climb.

4. Gradually add power at the recommended climbing airspeed (still holding the same rudder position) and note the nose deviation to the right as normal climbing manifold pressure is reached.

a. The cyclic will probably be left of center to keep from turning, so try to center it to feel the effect.

5. From the normal climb, ease the cyclic aft and see how slowly the helicopter will fly while maintaining climbing power and holding to the same track with left cyclic. When the angle between the longitudinal axis of the helo and its track reaches 45-50 degrees, it's time to quit. This maneuver will show you what the bird will do without a tail rotor, under the conditions simulated.

If the limits of the maneuver noted here are reached anywhere along in the process, check the rudder position (a good job for the copilot). If the rudder position is correct, approach the limits of the maneuver again, but favor less power and more airspeed to find the actual limits under varying circumstances, plotting airspeed against manifold pressure with a constant RPM.

The next step is to plot airspeed against manifold pressure with constant altitude and RPM.

Now is the time to land and think about what this experiment has told you—to wit—the limits of stabilized, (unaccelerated) flight compatible with the loss of your helicopter's tail rotor.

Only a few elements are now unaccounted for in the "for real" emergency.

1. Occurrence at a time when flight is not compatible with tail rotor loss (too much power and/ or too little airspeed).

2. Pilot reaction.

3. The accelerated rotation about the aircraft's vertical axis at the time the tail rotor is lost and the initial action necessary to cope with it.

4. The alteration of the center of gravity brought about by the separation of a structural member (ouch!).

5. The landing !!

Regardless of his position, the pilot's first instinct should be to lower the collective except while hovering, at which time he has no alternative to splitting the needles. This is, of course, to lessen the torque couple that impels the helicopter into clockwise rotation about the vertical axis. A quick evaluation of his circumstances in terms of the above experiences will tell the pilot if he is in real trouble and a conditioned reaction should bring the aircraft quickly under control.

If the helicopter is not making enough airspeed to prevent a rotation beyond 90 degrees from the original heading, the helo will soon be completely out of control around the lateral axis unless an autorotation is entered immediately. This unhappy turn of events is caused by the blades flapping upward, into the direction of the relative wind (now rearward), beyond the limited capability of aft cyclic to pull the nose up. The resulting maneuver is a rearward flare, bringing the nose attitude acutely down. This too can be recovered from with appropriate control and sufficient altitude, but the aft cyclic that the pilot would instinctively hold to pull the nose up would cause the blades to cut the tail off when the flare dissipated, and flapping action diminished.

So maybe it can fly without a tail rotor! Great! . . . But what about the landing?

A landing can be accomplished safely upon any smooth surface which will allow a 300-400 foot rollout. It can be done *with* power and *with* directional control to the degree allowed by the control the pilot has with his throttle to adjust torque. Here's how it's done.

Let's take it from slow cruise at 200 feet altitude. Line up the track with the runway and commence a standard letdown, but maintain gliding airspeed to about 30 feet altitude. Interrupt your glide with a gradual flare while gently increasing RPM about 200 turns above normal cruise setting (3400 in HTL, 2600 in HO4S-3). A slight overspeed is better than a scraggled helicopter. The nose of the helo will be 10 to 30 degrees to right of track as RPM is increased, but don't sweat it.

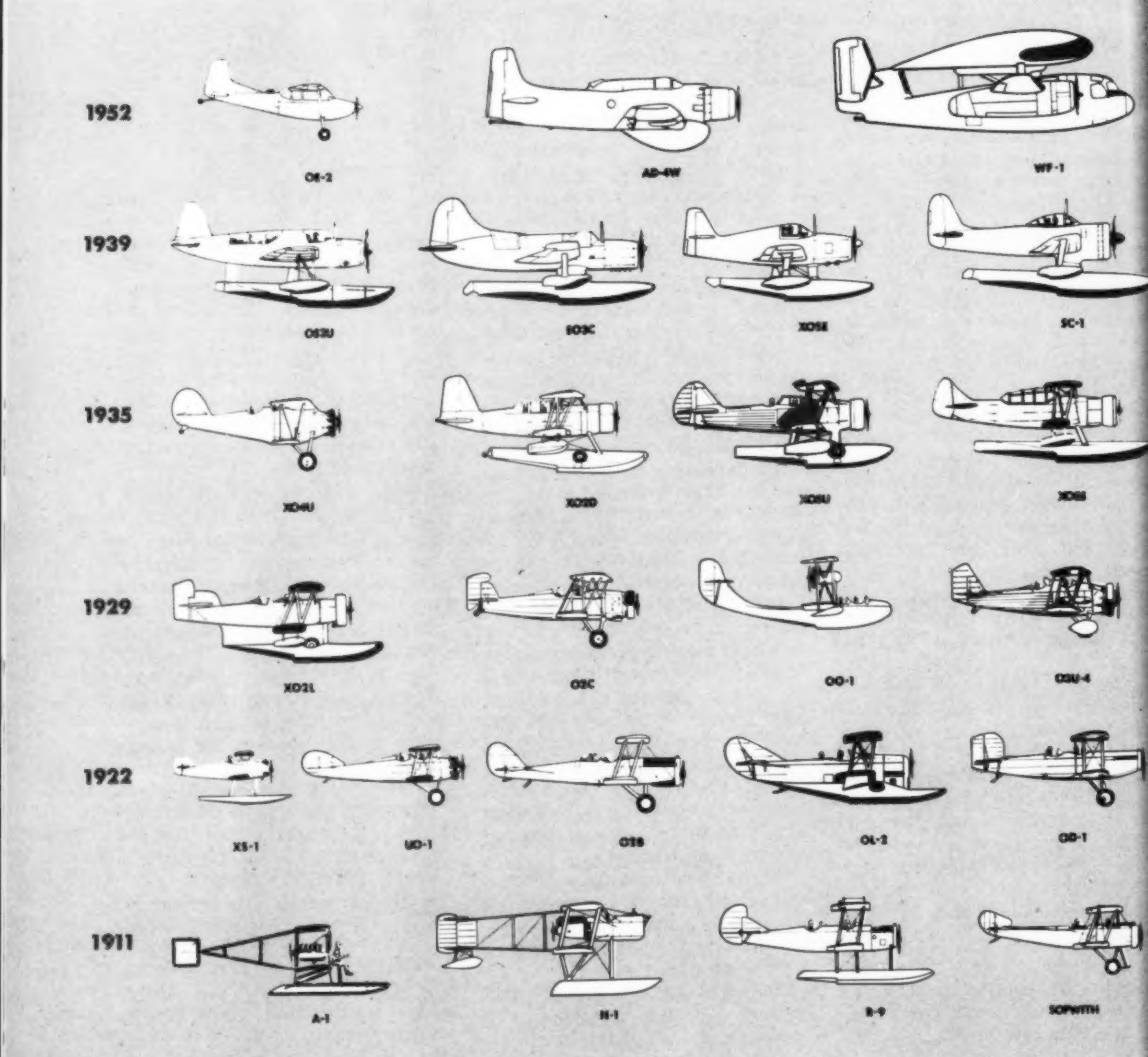
Follow through with the normal running landing procedure from the most highly rotated nose position—let the nose fall through and, just before ground contact, smoothly back off on the throttle at a rate which will cause aircraft alignment with the track and keep it there through touchdown. Once on the deck, bottom the collective, get on the brakes and maintain heading control with the throttle. ON throttle—RIGHT rudder; OFF throttle—LEFT rudder.

This landing technique can be easily simulated by positioning the rudder pedals in a manner similar to that established in the earlier experiments. Such simulation could be cheaply and safely done in HTL skid or wheel configured helicopters. The larger articulated helicopters' rotor systems might possibly be endangered.

So why not autorotate? In autorotation there is *no directional control* and unless zero airspeed is attained in the flare, a groundloop is almost certain to result.

The autorotation is a standard maneuver to be practiced to prepare for the eventuality of engine failure. It would be interesting to know how many victims of tail rotor failure have also experienced an engine failure. In other words, this just might be a very worthwhile maneuver to standardize for single rotor helicopter outfits.

If you ain't tried it, don't knock it. ●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DEVELOPMENT OF U. S. NAVY OBSERVATION PLANES

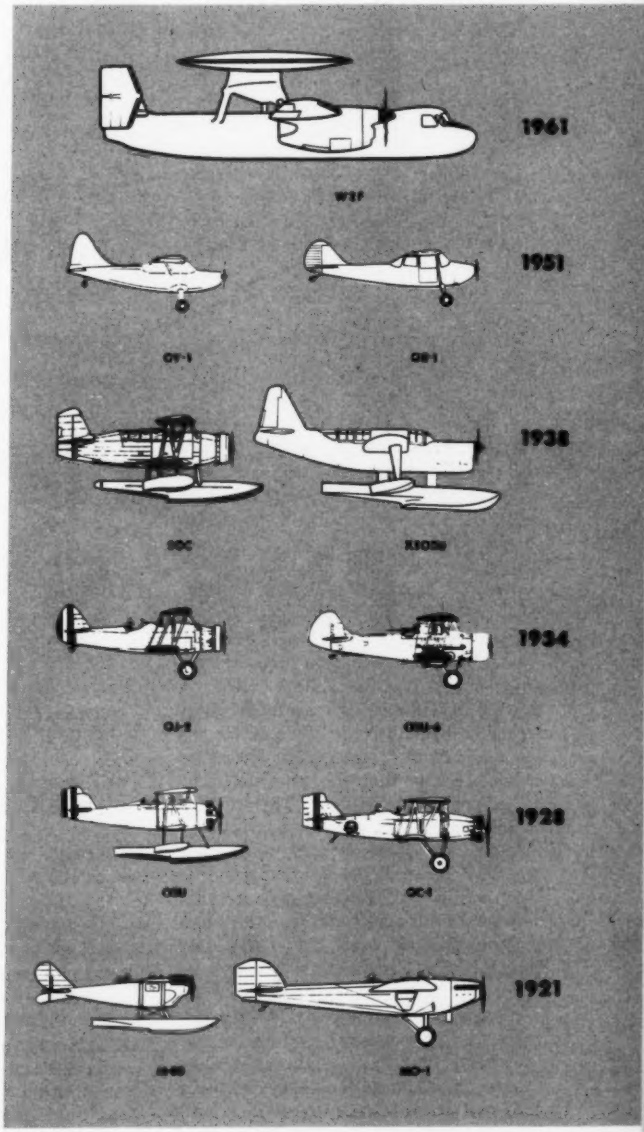
NOT many months after the first airplane was purchased, the Navy put aviation to practical use—for observation and scouting. This aspect of naval aviation has always been closely associated with shipboard operations. Until after WW II, VO-class aircraft were required to operate from wheels or floats and were a familiar sight on the catapults of the big-gun ships. "Slingshot" flying as it was called, came to an end in 1949 and the planes which assumed "observation" duties launched from carriers.

Equipment has changed as much as the aircraft used; from the eyeball and Aldis lamp to radar and radio, which accounts for the airborne early warning aircraft on this chart.

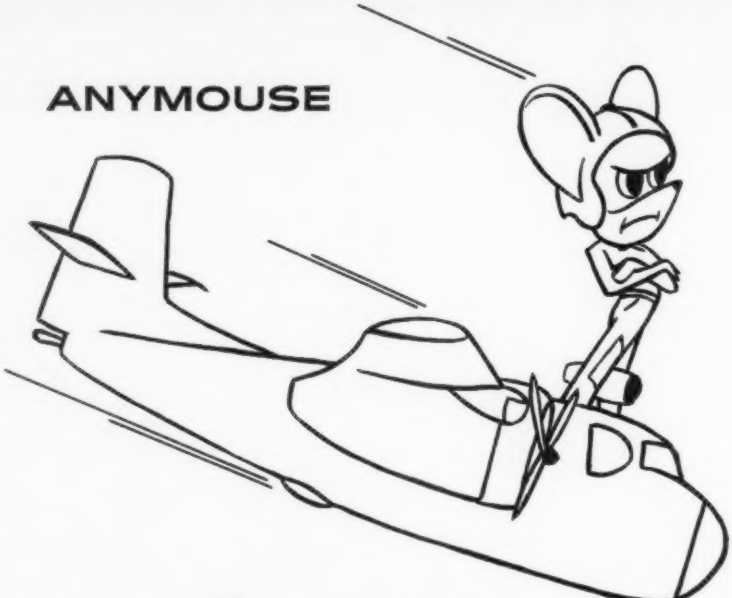
A fair number of these planes have had joint use by the Coast Guard and Navy: The small 00-1 flying boat was a "USCG only" design. A few others have been "USMC only." Examples are the Boeing 02B, a reworked version of the DH-4, the OD-1 and OC-1. Grumman's turbo-prop XOF-1 was to have been a Marine type also.

The Cox-Klemin XS-1 was a departure from conventional design only by its size; however, the plane's mission was unusual. It was to have operated from a submarine, an idea intriguing to many navies but which ultimately gave limited success. Guided missiles revived the concept although the role of the sub was reversed. Where the plane was intended to increase the sub's offensive power, the sub now is the means of extending the missile's power.

Of the designs which failed for one reason or another, none had a more pioneering flavor than the N-1. This was the Navy's first attempt to design and build its own aircraft. Greatest benefits of the project turned out to be the experience gained by the designers and engineers since some were later involved in the design and construction of the trans-Atlantic NC boats.



ANYMOUSE



don't give up THE SHIP

WHILE on a night airways flight in the soup over the western mountains, our S2F was at 11,000 feet approaching the destination airport. Flight conditions resulted in light rime ice but all de-icing and anti-icing gear was working properly so the hop was shaping up into just another night instrument flight, the kind of time you can't buy from an instructor.

Suddenly the starboard fire warning light came ON but engine indications and a visual check of the nacelle gave no proof of fire. However, after a small conference in the cockpit the starboard engine was secured and Center was advised. The aircraft was above single engine ceiling and a shallow drift-down was necessary.

Just after clearing the clouds, 15 miles out from destination, the copilot keyed his mike to call ATC and there was a sudden awareness that all radio gear had failed, including nav aids (we found later that the port generator shaft sheared from overload).

The glow of lights from the destination city could be seen ahead and with the port engine operating well it seemed to be just another night, single-engine approach, the kind you can't buy from an instructor.

Now there entered a new complication. The tower operator at the field received word from ATC that they had lost communications with us so the tower controller commenced flashing the high intensity runway lights. We were on a final approach (a long straight-in to a 12,000-foot runway) when the switch on the runway lights shorted and the black hole really turned black. Just before this development our ICS had faded along with all instrument and nav lights though we were getting along with the aid of the copilot's flashlight.

With this double failure of lights in the aircraft and on the ground it was like living in a cave. Full power was pushed to the good engine and the gear sucked up quickly. Airspeed, according to what the copilot's flashlight revealed, was 100 knots. The pilot elected to make a shallow turn into the dead engine for 90 degrees then a 270 turn to the left to line up with the runway in the opposite direction. All the time we were hoping the runway lights would come back on but they never did.

Agonizing seconds passed during the struggle to maintain altitude (field elevation 5000 feet) and negotiate the turn back to wings level in the general direction of the runway. This was shaping up to be one of those horrible, hairy things which no instructor in his right mind would want to buy.

When we were roughly lined up on a downwind heading the gear was dropped and the pilot yelled for a gear check. This went unheard by the copilot who in turn yelled back "100 knots" but this also went unheard by the pilot. Somewhere in the vicinity of the runway the pilot chanced a glance out the side window and saw the white blur of runway markings. We were so low a reduction in power put us on the runway almost immediately.

Crash vehicles met us and guided us to the line. It was two haggard pilots who emerged from the shambles to learn that a slight dent in the starboard fire-warning element, no more than two inches from an exhaust stack, had initiated the whole thing. Three strikes is *out* only if you give up!

Dear Diary

1405: Launched as pilot in OE-2 on observer training flight

1500: Flight proceeding as briefed (altitudes ranging from 1000 to 4500 feet)

1530: Checked left wing tank and made mental note to switch to right tank (full) in 15 more minutes

1545: I switched fuel gage switch to right tank and reach for tank selector valve. Observer interrupts this action with directions to descend and orbit specific checkpoint.

1550: Mission of observation completed—returning to home base. Quick check of fuel shows almost full tank (engine not feeding from that tank however)

1558: Tower clears aircraft to downwind following helicopter already downwind. I acknowledge for clearance and sighting of helo

1559: I perform landing checklist when tower requests helo to do 360 turn to gain interval in landing pattern. Much caution and heads-up needed to avoid helo (habit pattern broken again)

1600: As wings roll level on final approach, engine ceases to be "prime mover." Altitude approximately 75 feet over first third of runway.

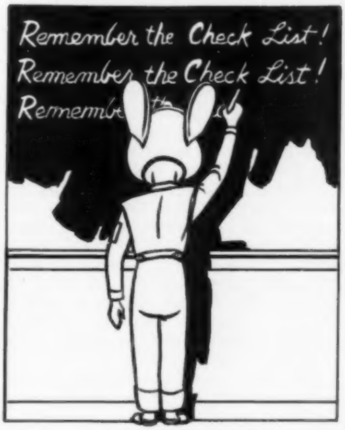
1602: After dead stick landing (and heart palpitations of observer) I *now* switch tanks, restart and managed to taxi to squadron line

Moral: It took 2800 hours pilot time for this to happen to ME. Must use checklist to double check long formed habits, and prevent interruptions from fouling me up.

Around the Horn

Cleared to enter traffic downwind, I checked things over: Altitude 1000 feet, airspeed 230 and in good position paralleling the duty runway. Next I pulled the throttle back while also lowering the speedbrakes—Oops! Flameout! I had pulled the throttle to cutoff!

Relight, using shotgun igniters and emergency fuel control was successful but I was down to 140 knots and 400 feet by the time the F9F-8T was under control again. You *always* need to be alert around these machines.



Checklist Save

It happened on a sunny afternoon in Naples. Anymouse was ferrying his AD-6 back to the carrier after a 10-day divert during which an engine change was performed on the aircraft.

He taxied to the turn-up area, performed his engine checks and was cleared for takeoff. After lining up, he locked the tail wheel. Ready to add power for takeoff roll he remembered something—the checkoff-list. Using the touch method Anymouse quickly went down the list until reaching one item—wingfold. Righto! The red D-handle was out and as he sheepishly lifted his head he noticed the wings beside him, well folded and blocking the view on either side of the plane. After actuating the handle, checking the wing-lock and completing the checkoff-list an uneventful takeoff was made.

Anymouse, having been away from flight deck directors who give the unfold wing signal, was completely unaware of the aircraft's configuration until the checklist was used. Normally Anymouse completed this list in the turn-up area but he was in a hurry to make a Charlie Time.

Fiddle Finger

As a helicopter maintenance check pilot, with over 400 hours in the HUS, I had just completed a short test hop and had been cleared for a final landing. After landing I taxied back toward the flight line and at this point I unlocked my shoulder harness, or so I thought. Actually I had moved the fuel selector switch to AFT or OFF. Of course the result was an unexpected loss of power.

Since I was firmly on deck the only damage was to my pride.

In the HUS-1, 148 series and subsequent, the old standard type fuel selector found in previous models has been replaced with a nice, neat two-position switch. This switch, when felt through the thickness of a flight glove, feels a great deal the same as the shoulder harness release lever. Coupled with its extremely close proximity to the harness release, the position of the fuel switch seems to make an ideal setup for an accidental fuel starvation type accident.

You can look at the lever before moving it but this is no solution when night flying. The only other remedy seems to be to publicize the possibilities of error and emphasize these two controls in the blindfold cockpit check given to all new pilots. ●

Have a problem, or a question?

Send it to

headmouse

he'll do his best to help.

Challenges Board

Sir:

In reference to the March 1961 APPROACH, pages 43 and 44, "Mislead Troubleshooters," objection is taken to certain information and opinions expressed in the subject article. These will be covered chronologically as they appear in the article.

(1) *It was stated that icing of the carburetor screen and venturi was suspected.*

Criticism: It was considered highly improbable that icing of the top deck screen could be of such magnitude as to preclude the engine gaining more than 2200 rpm without the flight crew being aware of it and applying remedial measures, i.e., carburetor heat and/or alcohol. At no time was it stated that the flight crew visibly inspected the engine to determine if any unusual condition existed, i.e., smoke from the PRTs, etc.

(2) *It was stated that ice was found on the screens and in the venturi. The ice was removed, the parts reinstalled.*

Criticism: It was unlikely that any ice would remain on the screen—after the amount of time available to melt even a very large block of ice. It is strongly suspected that the troubleshooting crew expected to find an obstruction such as a dessicant bag or a rag on the screen. In the highly remote possibility that ice was found it is not feasible that the screen or venturi were removed and reinstalled as stated since this is unnecessary, a suspicion of icing could be resolved by turning up the engine and using alcohol and carburetor heat. During the later run up it is stated that the engine ran normally until 2250 rpm was obtained. Criticism: No mention is made of an ignition analyzer check or a mention made of the outside observer checking the suspect engine for any abnormal condition, i.e., smoke from PRTs, etc. When the engine cut out at 2250 RPM no mention was made as to whether the CAT was observed to determine if it was actually back-firing or after-firing.

(3) *The plane captain was criticized for securing the engine by the use of the mixture control rather than the firewall shut off.*

Criticism: It is strongly felt that the plane captain used proper procedure in that utilizing the mixture control will insure immediate securing of the engine, whereas, utilization of the firewall shut off alone will allow the engine to run for approximately 60 seconds at idle RPM. The plane captain should have actuated the firewall shut-off after the mixture was placed in idle cut-off.

(4) *The accident board agreed with a diagnosis of ice in the carburetor.*

Criticism: Somebody snowed the board.

(5) *It was again stated that a compression check wasn't deemed necessary at that time.*

Criticism: The troubleshooting crew should not have been criticized for not performing a compression check even on second guessing, as a compression check should follow many other troubleshooting procedures, i.e., cold cylinder check, wheeze check, etc.

Your magazine is considered an excellent authoritative source of technical material, therefore, criticism of this particular article has been deemed necesary in that the original flight crew was not criticized for (not) giving maintenance personnel any good data to start with. Next, that the accident board concurred in such a highly doubtful diagnosis as ice in the carburetor causing the trouble. Next, that maintenance was not criticized for not gaining any data at field barometric MAP when the engine appeared to run normally. Next, that the plane captain was criticized for showing good procedure in securing the engine with the mixture control. Next if your magazine is going to second guess, such as in the use of a compression check it would at least second guess with a more easily applied and more logical sequence of troubleshooting such as the use of a cold cylinder check when called for.

ANYMOUSE

TV-2 Communications Comments

Dear Headmouse;

Have you ever experienced giving a senior maintenance officer a constructive safety suggestion which would save several man hours work per aircraft and then have him completely disregard your suggestion?

I didn't give the first suggestion, but was present when another proficiency pilot recommended that the TV-2 aircraft at our West Coast air station be modified as follows:

To keep the UHF radio cord from tangling around the gear handle and other equipment in the cockpit, it was suggested that we connect the cord to the oxygen hose by use of the rubber rings similar to those which hold the oxygen mask mike cord to the mask. This small modification would greatly improve the small, cluttered TV-2 cockpit and would prevent the cord from tangling around the gear handle and from being disconnected unintentionally from the pilot's mike cords.

A month later I asked the LCDR

line officer if they considered correcting this easily corrected situation. His reply was "The TV isn't going to be with us long enough to waste time making modifications."

Second subject: Have you made a recent cross-country flight in a TV-2 lately with only 18 channel UHF and guard for radio transmissions and Omni and obsolete ARN-6 for navigation? First of all you will have to use half of your UHF frequencies for center discretes and approach control stations enroute. These will have to be preset prior to your take off and will have to be changed every time you land. There are several problems encountered when you are limited to only eighteen channels for communications.

The TV-2s at our air station are equipped with the crank type frequency setters and the frequency tuners in the front cockpits are so far aft on the right-hand console that even in daylight VFR I have trouble selecting a frequency and flying the plane at the same time. Invariably, the dual pilot in the rear seat does the tuning and the front seat pilot does the flying.

One of our TV-2 planes is equipped with Tacan. Most USAF T-33 planes have multi-channel UHF. In fact the USAF have just added a "Gang-Start" switch to their T-33 planes. So as a warm blooded (and hopes to stay that way) naval aviator, I asked the LCDR—line officer if there were any pending UHF and TACAN modifications which were to be added to our TV-2 aircraft.

His answer was "The TV-2 aircraft is an obsolete aircraft and it would seem odd for us to install this gear. The expense would not justify the installation. Besides that, don't you know they aren't overhauling any more J-33 engines? When we use up our present stock of engines these aircraft will be phased out."

As a J.O. I was satisfied, but asked another question anyway: "What is the tentative date for phasing out the TV-2 and what plane will replace it?" Since the line officer didn't know, another LCDR laughed and said, "Oh, probably in another 5 years!"

So now I am really curious and would like a reply to these questions (other TV drivers might be curious also).

1. Are the TV-2 aircraft now being phased out by the F9F-8T or other dual place jets? What date?

2. If this date is a year or more away, am I too critical asking for the present TV-2 planes to have multi-channel UHF and TACAN installed?

3. Apparently the multi-channel UHF and Tacan service changes have been issued for TV-2 aircraft. Are we at our air station in error for not installing this equipment?

ANYMOUSE

"All right! Which joker filed via the Southern Pacific Railroad?"

►The TV-2 is definitely not being phased out of service. Quite the contrary: ComNavAirLant is replacing some of their F9F-8Ts at overseas bases with the TV-2 aircraft and at NAS Oceana all T2Vs have been replaced by TV-2s. To meet these and other requirements a number of TV-2s are being depreserved at Litchfield Park. So it seems probable that the bird will be with us for a number of years. There is no ASC for the installation of manually tunable UHF in the TV-2. A shortage of C-905 control heads and a lack of funds to procure more makes this highly desireable step impossible. However, BuWeps letter AER AV-421/10 of 1959 authorizes installation of the C-905 control head in TV-2 aircraft in fleet custody where a positive requirement exists. The control head must be removed and returned to stock when the requirement no longer exists or when the aircraft is transferred from fleet custody, whichever occurs first.

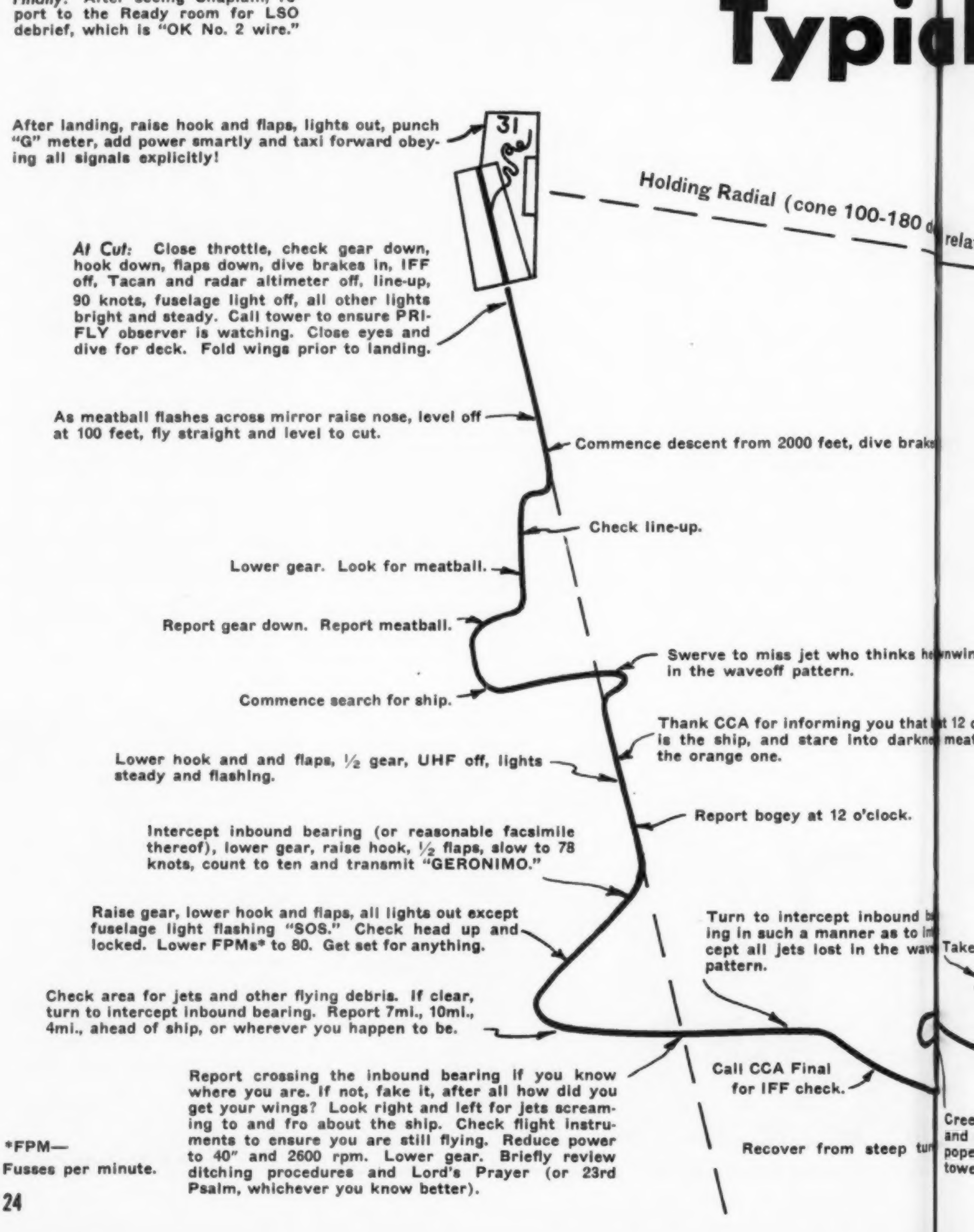
If the TV-2s you fly still have the OMNI selector located aft on the starboard console then ASC 176 (Urgent Action) of July 20, 1960, has not been incorporated. This ASC was promulgated by BuWeps FPWR-34-DLP PAC of 18 February 1960 and it specifies that the OMNI selector on all TV-2 aircraft except those having ARN-14 and ARN-21 installed, will be moved to the instrument panel.

The Safety Center concurs wholeheartedly with your complaints concerning the radio and navigation equipment installed in the majority of TV-2s, and has recently recommended to BuWeps that this obsolete gear be replaced with more modern equipment.

Very resp'y,

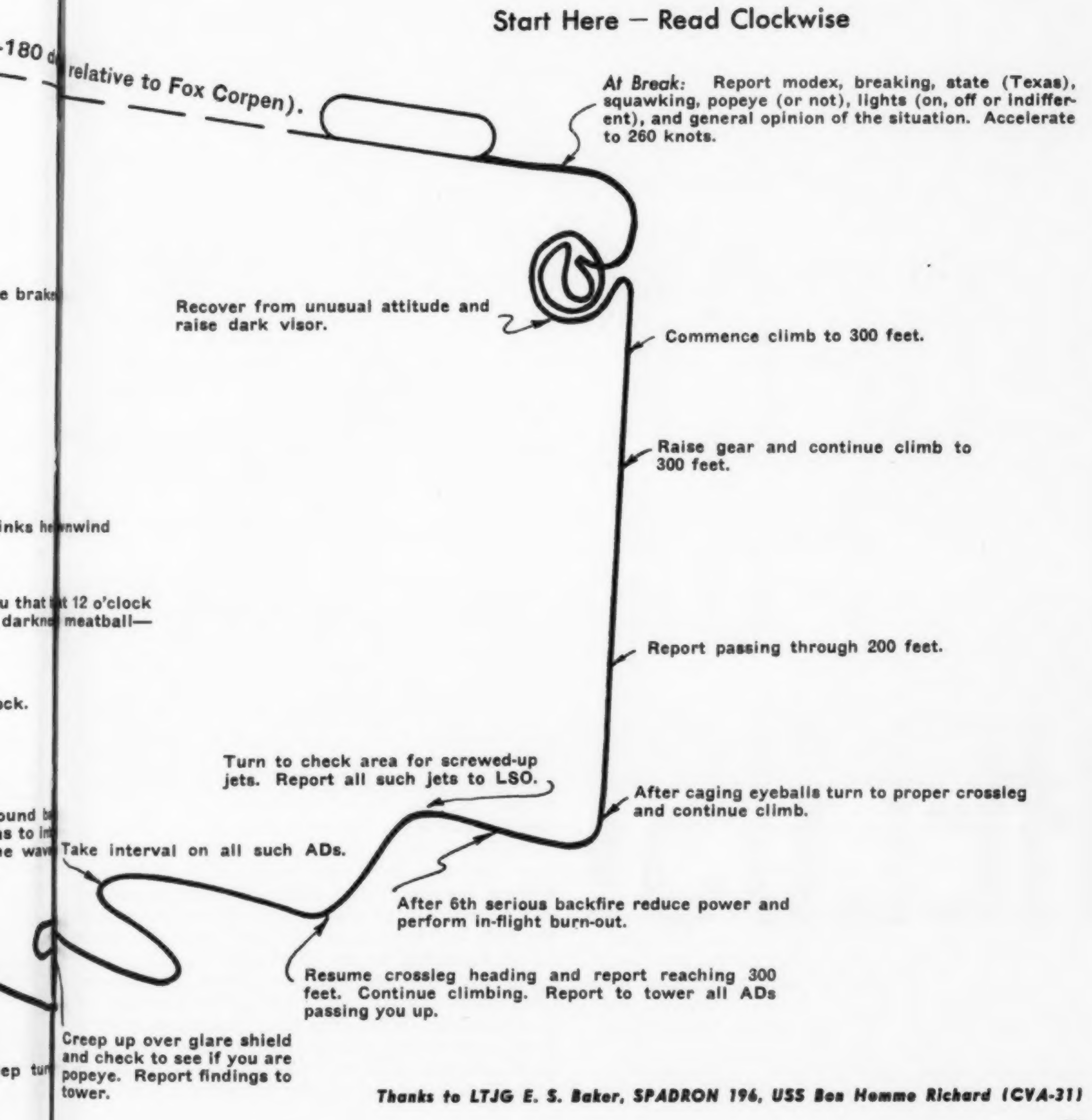
Headmouse

Typi



*FPM—
Fusses per minute.

ial AD CCA Recovery



Thanks to LTJG E. S. Baker, SPADRON 196, USS Bon Homme Richard (CVA-31)

GREEN DECK FOR HELOS!

Passing the word!

This is a very common phrase used daily throughout the entire Navy. Just how important it is to pass the word correctly can be seen in the following account of an aircraft accident which resulted from passing the word incorrectly. Only by chance was this unfortunate circumstance prevented from developing into a full scale disaster!

Two S2Fs of an 11-plane group were launched to conduct CCAs to touch-and-go landings for the purpose of night buildups. The CCAs were scheduled for 2000 but the pilots were briefed that they would commence when the deck was available. At approximately 2000, after consulting with PriFly and the bridge, AirOps passed a 2015 ramp time to CCA. Furthermore CCA was instructed to wave off all approaches at ½ mile until word was passed that the deck was clear. This was necessary because of a slight delay caused by helicopter launching and recovery operations.

The first S2F called commencing his approach at 2008. At 6 miles the S2F was shifted to the CCA final controller. At this time the fuel state, side number and final control button number were passed to the PriFly and LSO talkers by the CCA 1JG talker. The pilot was instructed that the deck was red (foul) and to standby for a waveoff at ½ mile.

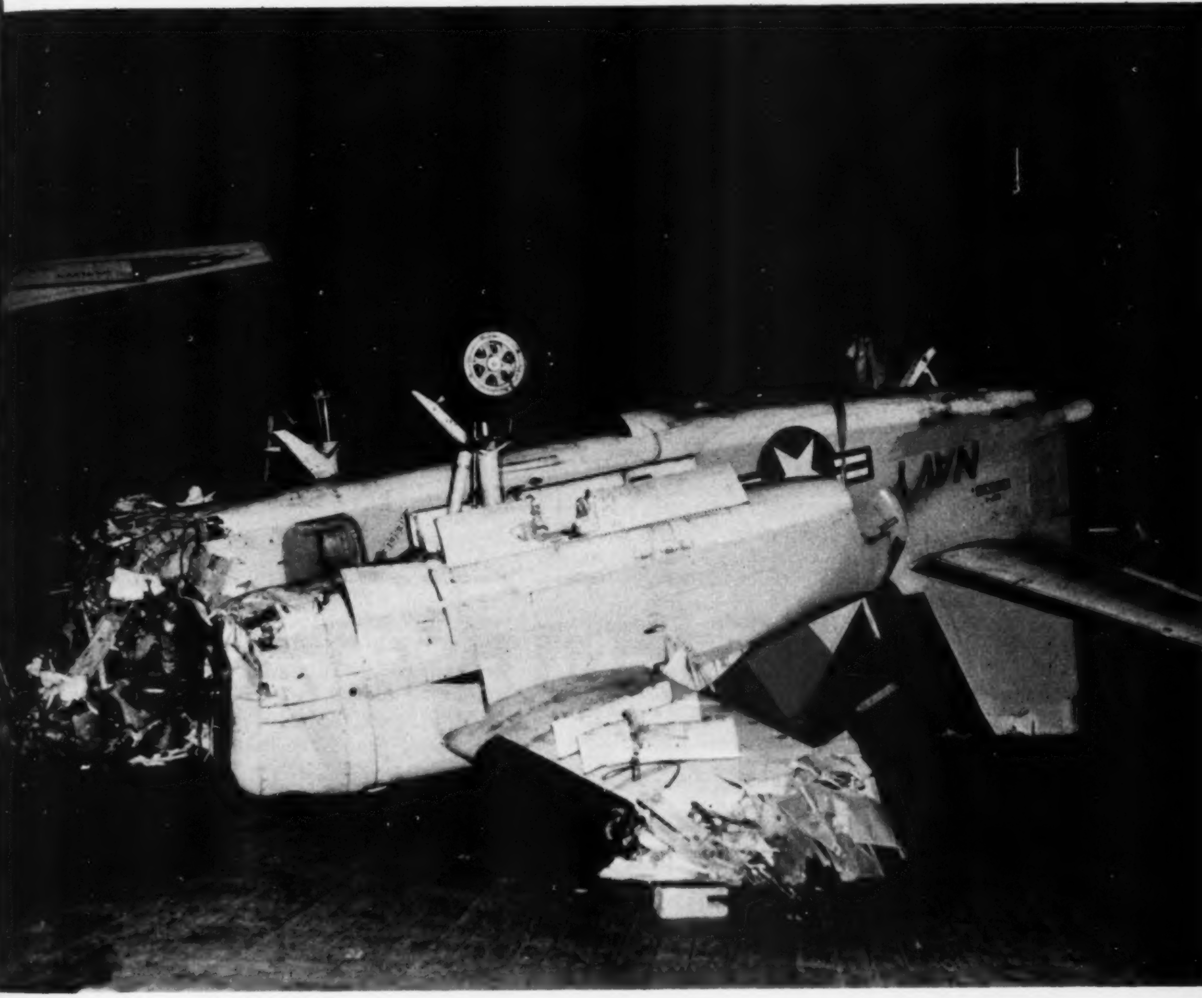
Meanwhile the CCA 1JG talker had taken it upon himself to ask the PriFly talker if the deck was red. When the PriFly talker received this query from CCA he turned to the Air Officer and asked him the status of the deck. The Air Boss, who was preoccupied with preparations for launching a standby helo, replied that the deck was "green for helos only." The word went back to CCA "negative"—meaning to CCA that the deck was not red.

To reaffirm the answer CCA then asked if the deck was green. The reply from the PriFly talker was "that is affirmative." This information was then passed to the final controller who relayed to the pilot that the deck was now green and he was cleared to continue his approach. The pilot acknowledged and called meatball-props at approximately ¾ mile. He was instructed to take over visually and land.

At this time flight deck personnel and PriFly were engaged in recovering an HSS which had declared an emergency. The HSS was recovered at 2019 and spotted aft on the starboard side of the flight deck. Three other helicopters plus the ship's TF were spotted on the flight deck.

The LSO platform was not manned although the LSO talker was just aft of the platform setting up his radios for CCAs. The LSO was standing by in flight deck control waiting for the helo operations to be secured. Another LSO was standing in the catwalk just aft of the LSO platform while an

Air Ops Officers and Air Officers of other ships should read and take stock of their control procedures. They too will soon be involved with night helo operations.



LSO in training was standing well aft of the platform in the port catwalk.

As the S2F approached the ramp for the touch-and-go landing, the LSO in the catwalk realized that the aircraft was not going to wave off. He yelled for a waveoff and started for the platform. The LSO talker heard the yell and reached for the waveoff trigger energizing the mirror waveoff lights. But the aircraft had already crossed the ramp and the starboard wing struck the rotor head of the helo which had just landed. This impact removed 14 feet of the S2F wing causing a violent yaw to the right. Simultaneously with this impact the pilot had seen the waveoff lights and applied full power.

He now continued up the deck striking in rapid succession the two helos parked on the port side of the deck. By this time the S2F was in a 45-degree nose-down attitude sliding along the deck on its nose and beginning to come apart at the cockpit. The next impact was with a tractor that had a tow-bar attached to the TF. As a result of this collision the S2F flipped tail over nose and came to rest in an inverted position (See photo).

Miraculously, fire did not break out. Both pilots were seriously injured. The two crewmen

sustained minor injuries. In addition to the S2F, two HSSs received strike damage while two other HSS aircraft plus the ship's TF received damage necessitating major overhaul.

That such an accident could occur is almost inconceivable, especially when there were in effect at the time numerous procedures designed to prevent just such an occurrence—the landing of an aircraft on a foul deck!

However, in investigating and analyzing this accident, the AAR board discovered numerous variations from these standard procedures. It is unlikely that any single variation could have been the sole cause of this accident, but when each was viewed in relation to the others and compounded into a whole, the stage was set and the result inevitable.

√ Control Stations Conn, PriFly and AirOps were not advised that the S2F had commenced his approach.

√ Because the Air Boss had not been advised that the approaches had commenced he had not turned on his ARC-27 for the standard PriFly monitor of CCA.

√ Standard procedure was to secure the mirror and deck lights when not engaged in recovery of fixed wing aircraft. In this case the mirror was left on for possible use by the helo that had declared an emergency.

√ The significance of the PriFly 1JG talker's erroneous passing the word "Green deck" vice "Green deck for helos" was that it gave clearance to an aircraft to continue an approach to a fouled carrier deck.

√ The lack of a standard procedure which would ensure that the LSO platform was manned prior to commencement of CCAs contributed to this accident. It was not normal procedure to man the LSO platform when operating helos aft on the flight deck.

√ The CCA supervisor did not inform the AirOps watch officer that the first plane had commenced his approach and was inbound. This was a breach of normal procedures and contributed to the fact that PriFly and Conn did not receive an inbound report.

√ Another breach of normal procedures was that the CCA 1JG talker's report did not include distance and time at the ramp.

√ The lack of coordination between the control stations allowed an aircraft to make an approach without the knowledge of the full plan of action to PriFly.

Of ultimate importance was the fact that all stations concerned were not manned and ready for CCAs. Had the LSO platform been manned and ready the accident would not have occurred. The absence of a standard set of procedures for relaying deck status information is an important factor in that it allowed a talker to pass an unmonitored transmission of deck status. The standard phraseology for passing deck status information is confusing in that it is too easy to misunderstand when such similar terms are used for helo and fixed wing operations; i.e., green deck and green deck for helos.

As a result of this accident and certain recommendations by the accident board, corrective action was taken by the commanding officer of the carrier to insure that the circumstances which allowed the accident to occur could not be repeated. Corrective action taken included:

► Revising and expanding aircraft land/launch procedures between Conn, PriFly, CATCC and CCA. Checkoff-lists are now used by each station.

► Rescreening and giving intensified training in the proper performance of their duties to sound powered telephone talkers.

► Revising the CATCC doctrine to state the duties of CATCC and CCA personnel more clearly and precisely.

► Having the LSO man his station 15 minutes prior to any VFR recoveries or 30 minutes prior to any CCA recoveries including all practice approaches regardless of waveoff distance.

► Installation of a remote waveoff switch in the Air Officer's console in PriFly.

► A revised terminology for describing the condition of the flight deck for fixed wing aircraft. The deck is either "clear deck" or "foul deck." The condition of the deck for helicopters is relayed as follows: "clear deck for launching helos only" or "Fouled deck" or "Clear deck for landing helos only" or "Fouled deck." All references to colors which signify the condition of the deck have been eliminated in voice transmissions. *(In the interests of standardization, clear deck and foul deck may be better than red or green. However, neither terminology could have prevented this accident unless the "for helos only" was relayed. There still exists a need for better terminology to positively indicate this. Any suggestions?—Ed.)*

► Installation of both a red light and a green light at each final controller's station in CCA to visually present the condition of the deck. CATCC has been equipped with red and green lights. Both systems are connected with and are controlled by Conn and PriFly. ●

"The experience of others is the cheapest experience we buy."—*Anon*

You're in the Clear Now But What Is It Like at the Destination—
A Weatherman Speaks on One of the Problems of His Trade

JUST PLAIN BUSTED

I've been a weather forecaster for several years now and I've seen a few missed forecasts along the way. There was one early this year that was among the worst—Old Grif is lucky he's still alive.

There were a lot of items which came into the picture, a telephone briefing, lack of an alternate outside the immediate destination area, the weather itself and so on. What it really boiled down to, however, was a busted forecast. A reasonable and logically arrived at forecast, but still a bust.

Even if the pilots had shown up at the weather station in person, they would have received the same forecast—good weather at destination. It was a sound forecast, but one which did not verify.

Fortunately there were not four demolished birds and four injured or dead pilots. There could have been. Not that the weathermen were goofing off, not at all. Weathermen probably feel worse about busting a forecast than the poor guy who's flying. No, the weatherman doesn't do it on purpose.

Aviation Weather is still a junior science and the forecasting end of it will not improve very rapidly for many years. You can expect an occasional miss as long as you are part of the flying game. There are good men in the weather business, capable men, men of integrity. But they still miss one every so often.

What's the answer then? Ignore the weatherman? Listen to his forecast with reservations?

Not exactly. But there is one thing you can do. Accept the fact that there will be a time or two in your career when destination weather will be lousy—contrary to what the forecaster said. So, whenever you get briefed in the weather station be absolutely certain that you have a reliable alternate. Refuse to consider one that is marginal or doubtful. Take two if you want, they're free. But when you leave the ground, have an alternate that you're fully confident about, even if everything else concerning the flight is uncertain.

Never trust the weatherman—never trust him to be infallible, that is. Even by intelligent thinking he can make an error. Always insist on a good alternate. Give yourself that extra peace of mind by choosing the alternate that is entirely dependable. It really pays off.—*Condensed from November 1955 USAF "Flying Safety"* ●

Crew Rest

THE crew was tired when they got in. They had breakfast, turned in and obtained a good eight hours' sleep. When they reported they were rested and ready to go.

This was a crew rest stop as it was intended to be—too often they aren't that way.

Let's consider what can happen.

At or near alert time destination weather is forecast to be below minimum at the time of expected arrival.

A transient maintenance man discovers hydraulic fluid starting to leak out between a skin joint on the under side of the fuselage.

We don't know yet how long the ground time will be extended, but we do know it will be extended. The crew hasn't been alerted yet—so the alert is cancelled pending information on a definite takeoff time. Some time after scheduled alert—depending on how soon he wakes up and/or how many times he is called by members of his crew—the aircraft commander will call to find out what's the delay.

The situation is explained to him. He is told by the Duty Officer he will be kept advised. If the delay is due to maintenance changes, chances are he and the engineer and possibly the copilot will come down to see what is going on for themselves.

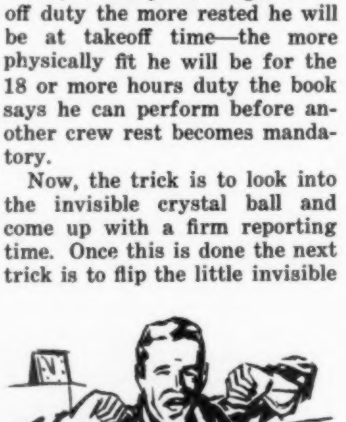
Humans seem to be naturally curious. And since crewmembers are human it will only be a matter of time until all crewmembers check with the aircraft commander on the reason they have not been alerted. Chances are about 50-50 that they will do this one at a time. Chances are also about even that half will check by phone and half in person. In any case the aircraft commander can count on no more uninterrupted rest until all have been advised of the situation.

In either case, weather or maintenance, the new departure time will at best be an estimate. Further it will be subject and likely to change several times before it becomes an actuality.

Now each crewmember has a problem of his own which he must work out all by himself in the best way he can.

Theoretically the longer he is off duty the more rested he will be at takeoff time—the more physically fit he will be for the 18 or more hours duty the book says he can perform before another crew rest becomes mandatory.

Now, the trick is to look into the invisible crystal ball and come up with a firm reporting time. Once this is done the next trick is to flip the little invisible switch that turns the human machine from the wide awake to the sound asleep condition just eight hours prior to the new alert time.



The plot is really thickening with theory now. Now the crux of the problem is to solve the dilemma with a happy ending.

We all realize the importance of crew rest. Maybe now would be a good time to call your flying safety officer—the chaplain being a non-rated man. In either case, however, the wide-awake-at-the-wrong-time dilemma is yours and yours alone. What you need is rest, at the proper time. No amount of sympathy will be a benefit 15 hours after takeoff when you start letting down at a destination barely above minimum.

The guy who can come up with the infallible answer to this one would be a soothsayer worth his weight in pure uranium dust to the many weary men who have tried and failed to solve the "always rested" dilemma.

Assuming a horizontal position is generally considered to be most conducive to sleep. Although, shortly after a sound eight hours this action too often results in a growing wakefulness—just the opposite of the result desired. However and even so, it is more conducive to rest than chewing fingernails down to the first knuckle.

If you are faced with the prospect of a galloping ETD, pursue the cause until the most valid estimate can be obtained, then *quit worrying about it. Relax!* That's the key. You may not be

able to sleep, but the more immobile you can become the more rested you will be when crew duty time is at hand again.

Sometimes the services of the engineer, and occasionally even of the pilot will be required to get the aircraft back in commission again. Particularly under these conditions frustration will try to wedge in to further weary and wear you down.

Since the "on-off" sleep switch isn't a reality, and indications are that it will never become so, let's consider methods that will ensure our being in the best condition possible for particularly tiring flights.

We don't have to look far. Doctors have for a long time expounded on the value of practicing certain preventive maintenance type measures designed to keep human machinery in the best possible condition. To list a few: Eat breakfast, practice moderation in drinking and smoking, follow a well-rounded dietary program designed to meet physiological needs; maintain the proper weight for age and height, get adequate exercise.

Flying is a demanding profession, extremely so on some occasions. It is difficult, if not impossible, to foresee the most trying flights. The best insurance is to be prepared to the best of your ability at all times.

When inflight problems occur, your best is the least that can be accepted. You stand to lose the most; therefore, you should make it your individual responsibility to be at your best. Insurance is a fine thing—for next of kin.

Add this important item to your checklist. As you walk out to the aircraft give yourself a preflight check. If you don't feel as sharp as usual, and if you could have done something about it and didn't, you are selling every crewmember and passenger who flies with you short.

And that, aircrewmember, is the way it bounces so many times—right in your lap! We know you are interested in safety—*Your safety*. Work out your own individual rest programme, then, if you have followed it to the letter and still find yourself fagged at flight time, remember the door has been left wide open when flying safety is jeopardized. The aircraft commander can declare crew rest.

Mats Flyer ●

Welcome Sight

At 1435, the F3H-2 launched from the carrier on a routine flight to NAS Atsugi. After a flameou

ALL land was covered by an overcast so I elected to go down in a clear area even though it was over water . . . At about 3500 feet, 240 knots, I ejected. (Squadron policy established 10,000 feet as the minimum controlled ejection altitude.—AAR) The ejection, seat separation and parachute deployment were normal. Zero delay lanyard was hooked up. Descending in the parachute, I released my life raft and let it hang free below me and prepared to enter the water. I unbuckled my chest straps, crossed my arms and grasped the leg strap quick release snaps. At the time my feet hit the water, I released the leg straps and threw my arms overhead. My right foot fouled for a few seconds in the harness and I was dragged through the water by the chute, but before I could make an effort to release myself, my foot fell free and I was clear of the parachute.

I estimated the wind at about 25 knots and the largest waves at about 25 feet in height. I inflated my mae west, then inflated my life raft and crawled aboard. About a half-hour later, I was very surprised to see a C-124 turning toward me. I signaled him with an orange day smoke signal and he appeared to spot me immediately. I also put out a dye marker. The C-124 appeared to lose me after his first orbit due to wind drift. Later, when I felt he could see me, I signaled again with another orange day smoke signal and he appeared to sight me again. More C-124s appeared on the scene and commenced dropping rafts. The first drop was not close enough for me to attempt recovering it. The second drop was closer but upwind. I was unable to paddle upwind far enough to recover this uninflated raft. I was experiencing severe nausea and vomiting due to having swallowed salt water on my entry into the water.

At this time I noticed that the attachment to which the sea anchor was secured had torn loose from the raft. The only reason I did not lose the sea anchor was because the life raft accessories were tied to the same attachment and I had the accessories in the raft. The C-124s commenced dropping inflated rafts but the rafts landed downwind and drifted away from me. Finally one drop was close enough so that I could paddle over and retrieve the accessory bag. I put this in my one-man raft and commenced paddling toward the inflated 20-man raft. It was downwind so I used the tarpaulin from the accessory bag as a sail and maneuvered close enough to where I could paddle to the big raft. I hooked my raft to the larger raft and boarded it. I was nearly exhausted from paddling and still nauseated and vomiting so I covered up with the tarpaulin and rested in an attempt to regain my strength. I found the transmitter-receiver section of the URC-11 radio but could not find the power pack. Previously I had attempted to use the emergency radio in my PK-2 kit but the plastic bag in which it was enclosed had leaked and it was completely water-soaked.

I searched through all the survival equipment I had now accumulated in an attempt to find something to alleviate my nausea. I found some chewing gum and this seemed to help as I did

nd engine seizure and an unsuccessful relight attempt, the pilot ejected. Here is his experience.

not vomit any more. With strength returning, I hauled my small raft aboard and settled down for a long wait. As I checked my equipment to see what I had available for night signaling, I discovered that my life jacket flashlight was dimly lighted even though the switch was off. I immediately loosened the cap and the light went off.

Some time after I was in the 20-man raft, I saw a C-124 drop a smaller raft with gear attached. I assumed they were trying to drop a radio for me. This raft was dropped downwind and I drifted by it but not close enough to retrieve it. Under the existing wind and sea conditions, I dared not risk leaving the 20-man raft to swim to recover the raft. When it became dark, I used my one-cell life jacket flashlight to signal my position to the circling aircraft. Later in the darkness if it appeared that the aircraft lost me I would light a flare. In addition, the aircraft dropped flares in my vicinity. Contact was thus maintained until the destroyer picked me up at about 2250. The destroyer demonstrated excellent seamanship and I encountered no difficulty in getting aboard.

After the rescue, the skipper of the destroyer made the following comment:

"This operation was conducted under favorable conditions whereby the position of the downed pilot was known and maintained by aircraft overhead. During darkness and sea conditions as experienced on this night, locating the downed pilot would have been much more difficult had his position not been known. The small flashlight was first seen from approximately 1000 yards and the raft from 500 yards."

In the first endorsement on the AAR, the commanding officer of the pilot's squadron comments on communications difficulties experienced:

"Communication difficulties continue to plague SAR operations. These difficulties were not focused on any one activity or any one phase of the operation. These communications difficulties commenced with the declaration of the emergency and prevailed throughout the problem. A contributing factor, not brought out in the AAR, was the difficulty in understanding the Japanese GCI operations. The language barrier necessitated several repeat transmissions. Guard frequency became jammed by several GCI sites and aircraft trying to assist with the rescue. All members of SAR should be reminded that SAR is a team operation and each member of the team must be given the opportunity to do his job . . . The SAR operation was an outstanding success in view of the weather, sea state and darkness. The activities that participated in the operations are commended for their aggressive and persistent actions that resulted in the rescue of the pilot."

"SAR communications on certain radio nets were noticed by one of the Board members embarked on the carrier during the rescue proceedings to be conducted with great difficulty. Extraneous transmissions and radio checks being conducted by stations not directly concerned with the rescue effort were felt to be responsible for this unfortunate state of affairs . . . "*—from an AAR*

Chins Chest Strap

AN FJ-4 pilot ejected at 9000 feet. Seat separation and parachute deployment were uneventful. However, the pilot was not able to get back in the sling during descent. Prior to entering a layer of overcast he unsnapped his parachute leg straps. The result was that he slid down in the harness until the chest strap was under his chin. He released his chest strap at about 2000 feet.

He hung on until he hit the water and then inflated his life vest. The parachute collapsed and floated away but some of the shroudlines tangled around his feet. He was still attached to the parachute by the raft lanyard connected to his life vest. Releasing the lanyard, he inflated the raft and climbed aboard. He cut the shroudlines with his knife and paddled farther away from the chute.

By this time the helicopter was overhead. The helo crewman signaled for the survivor to abandon the raft and he was quickly hoisted aboard.

As recommended by the training film "Parachute Landing Techniques" (MN-9299B) released last year, if you can't get back into the sling during descent the procedure for water entry is: disconnect your pararaft lanyard from your life vest, go into the water with your hands on your leg strap releases, then release your chest strap.

If you can get into the sling during descent, pull out your pararaft and let it hang, release your chest strap during descent, go into the water with your hands on your leg strap releases and release them after you enter the water.

Sling and Rescue

AFTER making a controlled ejection from an F8U-1 and descending into the water, the pilot was spotted by the plane guard destroyer. As the ship came alongside, several lines were heaved to him. He grabbed one and was pulled to a jacob's ladder on the side of the ship. After tossing his pistol to a man on the deck, he tried in vain to climb to the first rung of the ladder. The ladder was short; holding on to it was difficult because of the ship's rolling.

Finally, a padded sling was lowered to the pilot. He put his head and arms through the sling, detached his life raft and, with ship's personnel pulling him up, climbed the ladder to the deck.

"The padded sling is an excellent method for rescuing an uninjured man in the water," the reporting flight surgeon comments.

No Anti-G Suit

CONTRARY to squadron policy, the pilot in question did not wear his anti-G suit on this flight. He frequently does not do so, because he feels he has an exceptionally high G-tolerance. He stated that he "has pulled 7 positive Gs without the anti-G suit before and not even grayed out."

. . . Needless to say, one cannot always predict *when* G-forces *will* be operative. The above quoted words have a marked semblance to the "Famous Last Words" series. —*From an MOR.*

Firsts

"EVEN though this was my first ejection, first parachute descent and first use of the flotation gear, the frequent training lectures and demonstrations I have received made the whole procedure seem to be something I had experienced before."

—Pilot after F8U-1 accident

Overlearning

Survival training differs from most training in that it involves the learning of a variety of skills and procedures which must be overlearned. It is important that the lessons learned in survival training be remembered over a period of time and in stress or emergency situations. Psychologists know that retention over a period of time and in stress situations can be increased by having trainees practice even after they have apparently mastered the skill or procedure.

Psychological Aspects of Survival (HFORL Memo. Rpt. TN-54-4A, USAF)

Hatch Slams

A GROUND crew of eight was performing an acceptance check on an R4D-8. After the engines were started the plane captain requested that the port entrance hatch be closed. The structural mechanic went aft to close the hatch. He closed the hatch by extending both arms along the inner surface of the door, which is outboard when the hatch is open, and by kicking the release button with his foot. Immediately, he saw that he could not hold the hatch cover in the prop wash and, attempting to withdraw his arms, he stood erect.

Due to the curved fuselage there is a large space on the hinged side of the hatch between the fuselage and the door. When the mech stood up, his head was in this space as the door blew to and struck him. He suffered a broken jaw and bruises.

"It is remarkable that greater physical injury was not sustained due to the forces involved in this accident," The flight surgeon stated. "It is suspected that the engines were operating above idle speed, thereby increasing the force of the slipstream operating on the hatch," the report continues. "It is felt that this accident was completely avoidable and it is recommended that the personnel operating the aircraft be indoctrinated as to the proper turn-up procedures and proper closure of the hatch while engines are operating."

Canopy Caper

WHILE leaving the cockpit of an F8U-2 in which he had been working, an ordnance man slipped and grabbed the canopy jettison handle. The canopy blew up in the air, came down on his right hand and cut three of his fingers.

Maintenance personnel failed to insure that the canopy actuator safety pin was properly installed and although the ordnance mechanic checked to see that the seat was de-armed, he did not check the canopy actuator safety pin before beginning work in the cockpit.

SCUBA Diving

THE effect of flying to altitude after Scuba diving has been evaluated by the Naval School of Aviation Medicine and the following safety precaution is recommended:

"All personnel who have engaged, either on a recreational or line of duty basis, in Scuba or any other type of diving utilizing underwater breathing apparatus of any type to depths in excess of 30 feet (or who have been exposed to equivalent pressures in excess of this depth in a decompression chamber) should not fly to cabin altitudes in excess of 18,000 feet (or make decompression chamber ascents above this altitude equivalent) within 12 hours following the termination of such a dive or decompression chamber descent."

These guide lines should be utilized pending the issuance of instructions from bureau level. ●

Escape systems often provide the pilot his only chance for survival but a maintenance miscue anywhere in these systems gives him

...NO WAY OUT

by

L.A. Yeaton

Chief Aviation Structural Mechanic
Safety Equipment Analyst, NASC

Before the introduction of the low level escape system, with automatic seat separation and automatic parachute openers, the pilot ejected at much higher altitudes. Usually the pilot had time to overcome certain discrepancies of the ejection system. The systems were far less complicated with only a few moving parts.

But with today's automatic systems, which incorporate numerous ballistic charges, actuators, gas lines, mechanical linkages and drogue chutes, it is mandatory that each sequence of operation occur as advertised. All of the automatic features of the escape system must function perfectly as the time is very critical. One discrepancy can render the entire escape system inoperable. This is why more emphasis must be placed on quality maintenance of these systems.

Here are several of the maintenance errors which have been reported recently some of which resulted in injury and death to the pilot.

► In an F4H aircraft the cross shaft was found bent on the interrupter assembly of the Martin-Baker ejection seat. This condition was caused by using a speed brake jury strut to safety the canopy vice a canopy jury strut. Because of this condition,

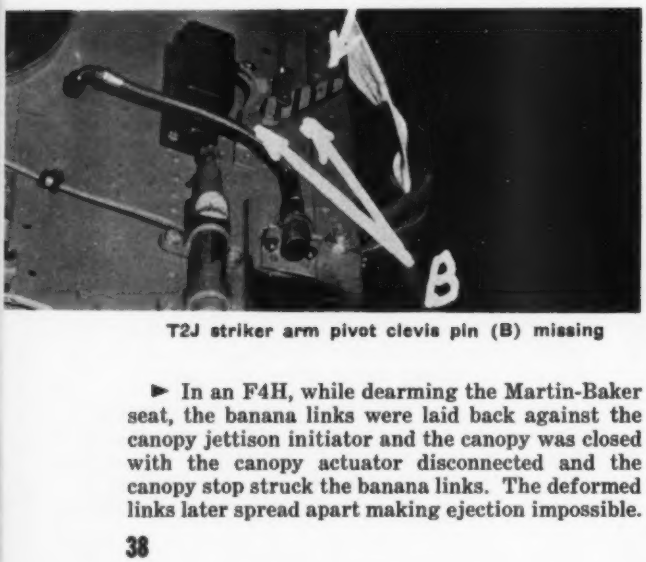
the ejection seat face curtain would not extend sufficiently to fire the seat.

► In an A4D aircraft the face curtain cable to the canopy jettison pulley mechanism was not connected. The pilot had to use the canopy jettison handle to jettison the canopy before ejecting.

► In an F8U the alternate firing handle could not be pulled on a Martin-Baker seat because the alternate cable had been routed between the bottom cross beam and seat pan. This caused the cable to be crushed when the seat was in the full down position.

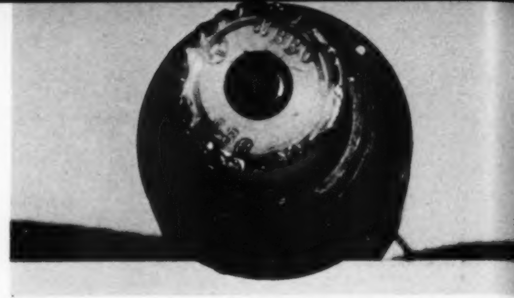
► In an FJ-3D aircraft the center pin and cotter pin were missing in the holdback release piston. This would prevent the ejection seat from separating from the aircraft.

Face curtain cable had not been connected to catapult jettison pulley



T2J striker arm pivot clevis pin (B) missing

► In an F4H, while dearming the Martin-Baker seat, the banana links were laid back against the canopy jettison initiator and the canopy was closed with the canopy actuator disconnected and the canopy stop struck the banana links. The deformed links later spread apart making ejection impossible.



Overtorquing of the drogue barrel forced cartridge inside gun barrel breech, flaring the barrel, rendering drogue gun inoperative. Proper torque is 160 inch-pounds.

► In a T2J aircraft the ejection seat malfunctioned during ejection in that the pilot was not automatically released from the seat. The cause of the malfunction was due to the pivot pin missing in the bellcrank arm of the aneroid device.

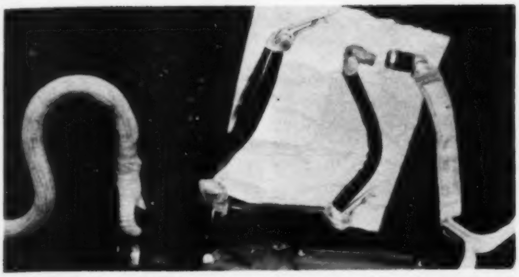
► During inspection of a Martin-Baker seat it was discovered that an accumulation of oil and water had collected in the bottom of the catapult tube. This was caused by using an excess amount of lubrication on the catapult tubes and condensation of moisture around the firing head. This accumulation of oil and water could possibly reduce the flame intensity on firing of the primary cartridge, which in turn would reduce the ejection force, possibly to the extent that the seat would not leave the aircraft.

► Inspection of a Martin-Baker seat undergoing PAR revealed notches of various sizes in the lower end of the drogue gun barrel apparently reworked at squadron level. Improper notching may induce stress concentration and subsequent gun barrel rupture during firing of drogue gun.

► Overtorqued drogue gun barrels on the Martin-Baker seat have been discovered in many instances. Overtorquing will cause deformation of the barrel cartridge. Reinstallation of the distorted barrel results in a space between the cartridge and the drogue gun body seat, allowing insufficient penetration of the primer, causing misfire of the drogue cartridge upon actuation of gun on ejection, necessitating manual separation from the ejection seat.

These maintenance errors rendered the escape system completely inoperable or interrupted certain automatic features of the escape system. All of these could have been prevented by improved training, more stringent supervision and rigorous enforcement of quality control.

Everyone involved with escape systems maintenance should be indoctrinated in their responsibilities and the need to ensure 100 percent reliability. When the escape system is called upon to perform its assigned task during an emergency, a fraction of a second can make the difference between life and death.



An unconnected drogue withdrawal line disconnect was cause of main chute not deploying and fatality of its user.

Seat Shop a Must

The need for flawless maintenance of escape systems is most urgent, as the foregoing article indicates. What are the factors which contribute to such improper maintenance? There are several, but the most significant seem to be:

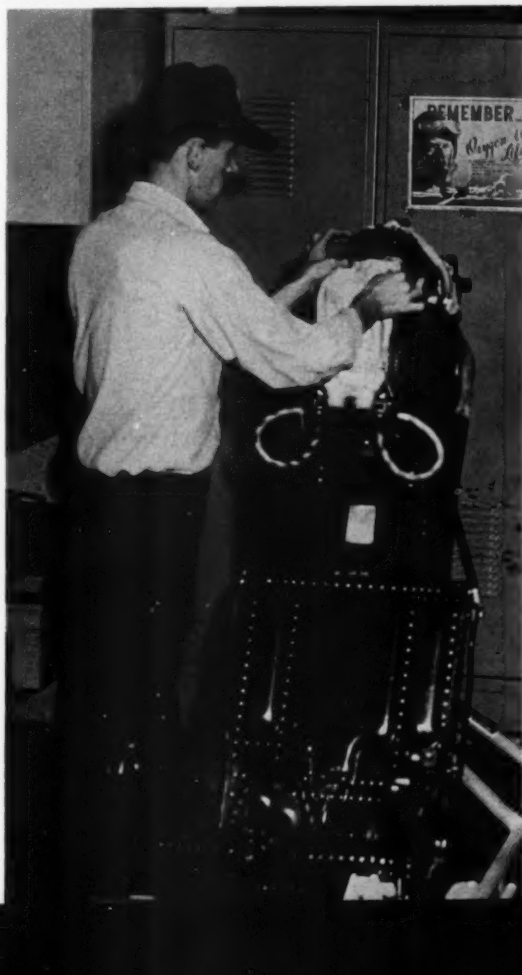
1) Lack of a separate shop for ejection seat servicing and maintenance—
2) Lack of uniformity in procedures and techniques—
3) Failure by some maintenance personnel to adhere to safety precautions—

The practice of removing ejection seats from aircraft and stowing them on wings of aircraft, hangar decks, flight lines, general shop spaces or other non-designated areas is not considered acceptable. To provide a proper place to perform maintenance and stowage of this life saving device, a separate seat shop much on the order of a parachute loft is essential.

While it may not be possible for each activity to maintain a separate shop, a centralized shop is believed feasible at each air station and aboard each carrier. Such a facility would result in more uniformity in maintenance and better utilization of ejection seat maintenance personnel. Special tools, test equipment and maintenance instructions applicable to ejection seats could be pooled in this shop for better utilization. Also, the possibility of damage to seats and associated equipment due to contaminants would also be minimized.

It is strongly recommended that all activities take aggressive action to bring escape system maintenance and facilities into line with the high standards demanded of all lifesaving equipment. The end result would be a more reliable escape system giving a flier complete confidence—knowing that when *he's gotta go, he can.* ●

Photos above and below — top O&R Norfolk and other two VF-101 Det A, NAS Oceana — show what can be done in the way of an ejection seat maintenance shop. Naturally, both an O&R and a RAG training squadron have more personnel and space than the average squadron. But in any case, proper quality control, coordination and squadron organization of ejection systems maintenance assures success when the pilot needs it.



how harmful is... Detonation?

pounded piston precipitated pranged power plant

Detonation is a sinister word. It implies destruction and disaster, and rightfully so because it is spontaneous and practically instantaneous combustion after the ignition event. Sometimes it is defined as "abnormally rapid combustion replacing or occurring simultaneously with normal combustion."

Whichever definition you prefer, detonation is very hard to identify with certainty in an aircraft engine. It is likely that its presence will be announced only by an increase in cylinder head temperatures and a loss of power. However, its ultimate effect will be a terrific increase in overhaul costs when (and if) your engine reaches overhaul.

Detonation can result from:

- The use of fuel with a lower than recommended octane rating.
- Excessive use of carburetor heat.
- Prolonged ground-run-ups when the ambient air temperature is unusually high.
- Premature use of high ratio supercharging.
- Inadequate cylinder head cooling due to poor maintenance of cylinder air deflectors, cowling, and/or air seals.
- Improper ignition timing.
- The abusive use of horsepower (overboost).
- Possibly the greatest offender, leaning of fuel beyond the point of normal combustion.

One of the greatest enemies of good pistons is detonation. When an engine is permitted to detonate, its pistons are subjected to many hundreds of sledge hammer blows per minute. The mutilation that results is visible at engine overhaul in the form of cracked and dished piston heads.

In a detonating cylinder the temperatures rise to abnormal heights. The alloys from which the cylinder head and pistons are made were not compounded to withstand this amount of heat. These high cylinder head temperatures can cause

the piston head to soften and the ring lands to warp. Warped ring lands will result in stuck piston rings. When the top ring is no longer free to rotate, path for the burning gases is open down the side of the piston at the now stationary ring gap. An area of local overheating is created and the ring land continues to soften. The ends of the top ring flutter against the ring land until the ring breaks and a top ring land failure is born. It is likely that this failure will be laid at the door of piston design or some metallurgical weakness while the real culprit is detonation.

Broken rings and cracked, dished, burned and scuffed pistons are not the only victims of detonation. The excessive temperatures experienced induce stresses into cylinder heads, and these stresses result in cracked heads and an unusually high rejection rate at engine overhaul.

Exhaust valves, seats, and valve guide bosses erode and burn when they are subjected to the passage of gasses of higher than normal temperatures. The effects of detonation are cumulative. An engine that is permitted to detonate for only short periods of time does not escape unharmed. Each period of detonating adds its measure of damage. Frequently an engine fails in normal operation as a result of the damage it received while detonating many hours previously.

Compromises must sometimes be made in order to satisfy the demands of power, range, cooling and economy. Whatever your problems, the solution must be reached *without* detonation.—***Flight Safety Foundation, Inc.***

If It Ground Checks O.K.

REMEMBER, there is always a reason for an in-flight discrepancy. It can be a misunderstanding on the part of the flight crew of the correct operational procedures, capabilities and limitations of equipment reported as faulty. It can also be the kind of discrepancy that will not make itself known until the maneuvers, vibrations and stresses of flights are encountered.

Even if a reported discrepancy "ground checks o.k.", discuss it with the originator. In many instances this discussion will be enlightening to all concerned, and all will benefit.

Flight crews should write up a clear, concise discrepancy report, and if necessary, discuss it with maintenance personnel.

Maintenance personnel should use their imagination, full technical resources and abilities. "Ground checks o.k." might be satisfactory for shoemakers, but not as a remedial action for yellow-sheet discrepancies. —***VAW-12, Maint. Dept.***

FOD

FOD Prevention "Scotchcals"

AN effective FOD program depends largely on the continuing awareness on the part of each mechanic that every tool handled is potential FOD material. Scotchcals, above, are applied in a conspicuous area on the inside lid of each mechanic's tool box to serve as a constant reminder of the importance of accounting for each tool handled. —*ComNavAirPac 61*

THIS BOX CONTAINS

F O D

COUNT YOUR TOOLS

"FOD" for Thought

HERE are a few FOD prevention ideas which, we believe, merit passing on.

As a part of an FOD prevention campaign, one unit has made use of several effective promotion techniques. It has strategically placed specially marked FOD brooms and trash cans within the maintenance engine runup area. To keep the idea fresh in everyone's mind, the phrase "Help prevent FOD" is stenciled on all transport vehicles and a large banner advertising the FOD campaign has been erected in the maintenance area. FOD prevention is a special topic for discussion at all squadron training periods. In addition, a directive has been published which requires that decks will be swept prior to an engine runup in the maintenance areas.—*AFLC "Safety Tips"*

INCIDENTS FLIGHT HAZARDS GROUND ACCIDENTS

THE final figures are in for Fiscal Year 1961. Overall, there has been a 22 percent reduction in the total number of Incidents, Flight Hazards and Ground Accidents compared to Fiscal Year 1960. However, before we start patting ourselves on the back, consider the cost of these mishaps, up 37 percent over Fiscal Year 1960.

We could purchase over 6 F4Hs, or 60 A4D-2s, or 27 F8U-2s, or 18 P2V-7s, or 27 HU2K-1s, or 18 HSS-2s or 19 S2F-3s with the money lost. These figures are quite impressive, but they speak only of the equipment dollar loss. These mishaps also took NINE lives.

Here is a breakdown of the mishaps, indicating the type, contributing factors, and location:

Incidents

A total of 639 incidents occurred, a small decrease from the previous year. Of these, VF were involved in 198; VA (prop) in 39; VA (jet) in 122; VS in 48; VT (prop) in 58; VT (jet) in 33; VP in 29; Helo's in 69; and all others in 43. The majority of these incidents, 465, occurred while shore based. The incident types were widely diversified. They included, among others, 33 collisions with other aircraft; 159 other collisions; 6 stall/spins; 123 airframe failures; 45 hard landings; 11 unintentional wheels-up landings; 38 losses of wheels and/or tires; and 22 undershoots. Considering the contributing cause factors, material failure was a factor in 238; the pilot in 329; other personnel in 177; air base facilities in 69; weather in 53; design in 49; and all other factors contributed to another 45 incidents.

Flight Hazards

A total of 1082 hazards occurred, a decrease of approximately one-third from the previous year. The majority of these hazards, 976, occurred while shore based. Hazards were divided among the various type aircraft as follows: VF were involved in 262; VA (prop) in 47; VA (jet) in 216; VS in 31; VT (prop) in 59; VT (jet) in 69; VP in 38; Helo's in 133; and, all others in 227. Bird strikes, hail, etc., occurred in 292 instances; forced landings in 55; unintentional jettisoning in 262; near collisions in 111; emergency field arrestments in 81; and, all others in 281 instances.

Ground Accidents

A small decrease in the number of ground accidents compared to the previous year was recorded. Of the 568 occurring, 390 occurred while disembarked. VF were involved in 135 ground accidents; VA (prop) in 34; VA (jet) in 83; VS in 47; VT (prop) in 30; VT (jet) in 23; VP in 36; Helo's in 105; and all others in 75. Considering all the contributing cause factors, material failure was a factor in 71; the pilot in 10; other personnel in 495; air base facilities in 82; and, all others in 124. Aircraft parked on the field parking line were involved most often, followed by aircraft located on a carrier's flight deck.

We can all help decrease this great dollar loss by continuing to strengthen our accident prevention program. Each mishap indicates a shortcoming and someone or something that needs correction! Take action *now* to reduce the number of exposures.

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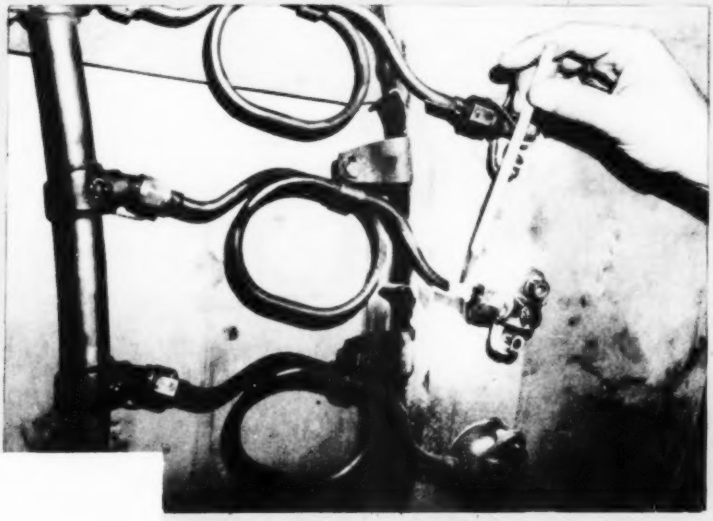
PIG-TAIL



DURING postflight of an F8U-2, the tail section aft of the fire seal at fuselage station 664, was found to be badly buckled, distorted and discolored by excessive heat. At no time during the flight was the pilot aware of any malfunction.

Investigation revealed that No. 24 pigtail had cracked 95 per cent of the circumference of the tube-to-sleeve-weld-joint. This permitted fuel under pressure to be sprayed between the Afterburner Intermediate Duct Assembly and the Heat Shroud Assembly and ignited upon afterburner selection.

There is no fire warning system this far aft, so, the pilot was unaware of the fire. The Heat Shield protected the area forward of Station 664 and the Unit Horizontal Tail Power Cylinders.

Cause of the failure of the pigtail was metal fatigue possibly induced by overtorquing of the B-nut.

The board recommended a parts replacement schedule be established since there is no overhaul program for the afterburner. This schedule would minimize the possibility of component failure due to fatigue.

Big Blow

At press time another accident was reported in which inspection revealed 5 of 24 pigtails were broken. Prior to this accident 4 of 5 flights reported afterburner discrepancies:

1. AB erratic
2. AB very bad at 40,000 feet—erratic thrust changes
3. Same as previous gripe
4. AB does not have power—rumbles badly. PR gage indicates nozzles operating OK

When this accident occurred, the aircraft was being turned up in an attempt to determine the afterburner trouble.

The accident board recommended that:

1) Pilots down aircraft after encountering irregular response from the afterburner.

2) Maintenance turnups investigating afterburner and serious engine malfunctions be made with the tail section removed. The pigtails were turned over to 2 P&W tech reps to determine cause of failure.

LINE SHACK

Maintenance Notes From Worldwide Safety Council Meetings

Quality Control Support

Chairman of the Maintenance Committee noted that effective quality control requires command support in the following areas:

√ Insure proper recognition of quality control as an autonomous division or branch with a full time primary duty officer assigned.

√ Commanding Officer designation in writing of quality control inspectors.

√ Require reports of follow up on quality control determined weak areas.

√ Insure that only a minimum number of highly qualified and motivated men be assigned Quality Control designation.

√ Require high quality weekly pilot aircraft inspections as an example for maintenance personnel.—*Fair Alameda*

Test Hops

The maintenance committee discussed BuWeps Inst 3700.2. This instruction promulgates information concerning aircraft test hops. The committee decided that as a matter of future policy, test hops will be scheduled after all major checks and that no test hop will last more than 1½ hours. Test hops will be flown by squadron pilots designated as test pilots in writing by the commanding officer.

The problem of detection of fuel contamination was discussed and the committee decided that fuel samples would be made by plane captains prior to every hop.

Taxiway Markings Right?

Pilot taxied a P2V into a taxiway adjacent to a row of A4Ds. Although he followed the taxiway markings, the P2V wingtip tank struck the tails of 4 parked A4Ds.

Recommendations include use of a wing walker when taxiing in an area of close proximity to aircraft, and safety officers checking taxiway markings on their surveys.—*CFAW-6*

Private Line

Discussion of a recent forklift/R5D ground accident. The officer who conducted the accident investigation presented a summary of the accident, its causes and corrective action initiated to prevent repetition. Vehicle traffic lanes are to be painted on pavement wherever aircraft and vehicular traffic are in close proximity. It was noted that some private vehicles are proceeding on aircraft areas and that stop signs should be installed at each bay hangar entrance.—*ComFAir Argentia*

Price of Cutting Corners

One of the most effective deterrents to personnel factor accidents is an insistence by unit commanders and supervisory personnel that unit SOP and local doctrine be observed in detail. Lives and aircraft are lost when pilots or supervisors or maintenance personnel attempt to "cut corners."—*3rd MAW*

Interviewing Down Checks

As a method of furthering Aviation Safety at HT-8, the Safety Officer now sees all students who receive downs in helo training. Many useful relevant items indirectly concerned with Aviation Safety are brought out during these interviews such as problems concerning food, quarters, home problems, instructors, etc. These interviews give an insight into areas which normally are never investigated or brought out in the normal Aviation Safety Program.—*CNABATraCom Pensacola.*

Aircraft Refueling

The squadron reported that they are painting the refueling inlets on their aircraft the same color as the type fuel required. MCAF fuel trucks have had their hose nozzles painted this way also. In addition both the truck driver and the plane captain must certify as to the type of fuel delivered. All squadrons must remain alert to insure that their aircraft receive the proper fuel.

—*Commander Fleet Air Wing Six*

Scratch One Canopy

In a recent F8U-1P canopy implosion, it appears probable that the implosion was made possible by a weakening of the canopy following the removal of scratches by blending out with an abrasive substance, thus reducing the thickness of the canopy material. The squadron has issued instructions on this subject which should preclude similar incidents in the future.—*FAirSoWestPac*

Liquid Oxygen

It was pointed out that a potentially dangerous situation exists periodically in the handling of liquid oxygen. Personnel *must* be required to take all of the precautions set forth for the handling of LqOX. APUs must not be operated in the vicinity of a LqOX operation. Active supervision is demanded by the highly dangerous nature of liquid oxygen and a thorough training program must be held for all personnel connected with liquid oxygen handling.—*ComFAirJapan*

Cockpit Checks

Modern aircraft cockpits contain essentially all the knobs, handles, switches, levers and buttons permitted by the space available. They also contain several sets of cords, hoses, belts and straps which must be stowed in some manner when not in use during flight. Little or no provision is made for carrying of baggage or of extra gear not essential to the designed mission of the aircraft. The need for large charts, and the normal navigational gear and packages of reporting and accounting forms for cross-country flight creates a hazardous situation. A requirement to carry any additional gear in an aircraft cockpit, including such hard-to-stow items as hardhats, will produce either extreme care in stowage or extreme danger in flight. With this problem in mind, it is recommended that both pilots and plane captains of dual aircraft be required to inspect unoccupied cockpits for security of all gear, straps and connections prior to flights.—*2nd MAW*

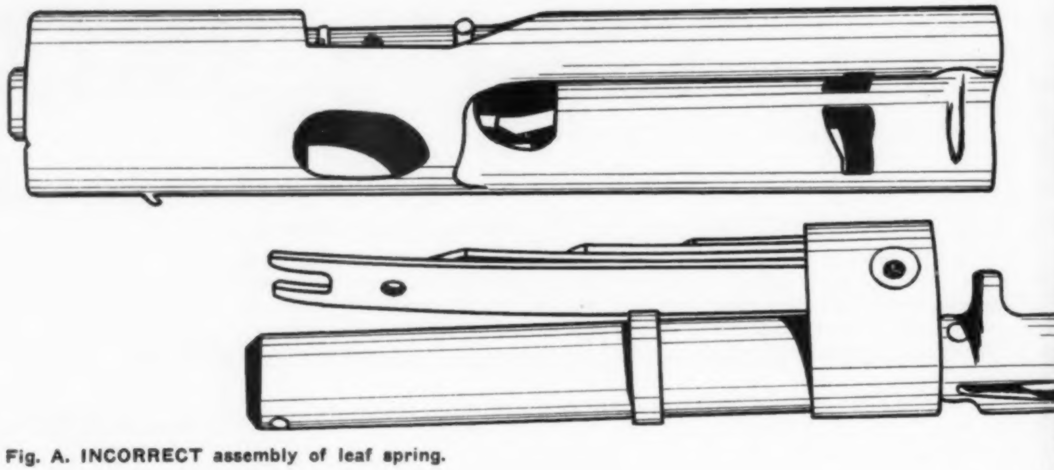


Fig. A. INCORRECT assembly of leaf spring.

MURPHY'S LAW*

Murphy in Automatic Parachute Actuator

Failure of the parachute to deploy in a recent ejection was the direct result of improper installation of the hammer spring in the Model 1000 series automatic parachute actuator.

The hammer actuating spring (as illustrated in the IPB of the 1000A Master Specialties Actuator, NavAer 13-15-503, items 17, 18, 19 and 20, figure 2; and in BACSEB 14-60, figures 7, 8 and 10) were assembled in inverse order with the shorter leaves outboard. *When assembled in this manner,*

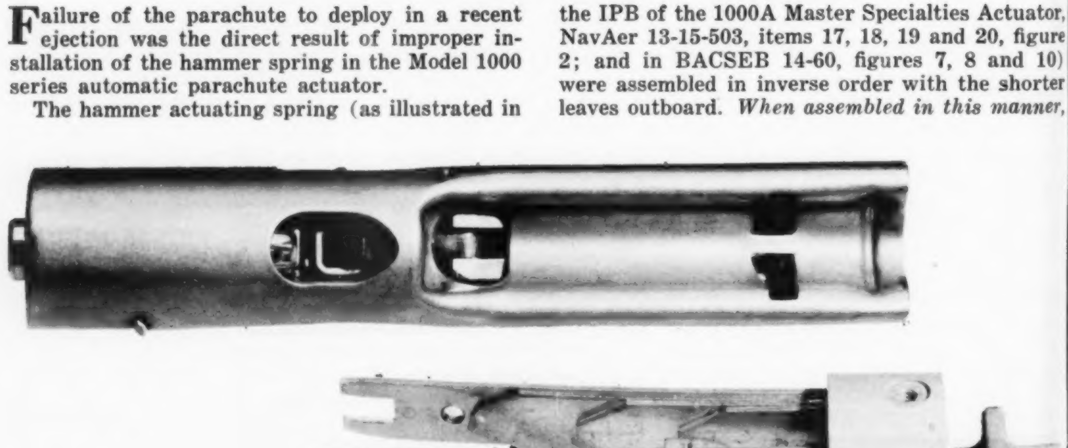


Fig. B. CORRECT assembly of leaf spring.

tension applied to the hammer assembly is insufficient to fire the time delay cartridge.

A similar instance of incorrect installation of this leaf spring was reported after an accidental actuation of a MS 1000 automatic parachute opener aboard ship last winter. This case was noted in the AMR Digest, in the March Survival Equipment Crossfeed and in message traffic. *—Crossfeed 11-61*

R5D Murphy

AN R5D was released by the Maintenance Department as having completed a major check. During engine run-up on the line, the flaps were actuated and damage resulted to the left wing flap.

The hydraulic lines were connected in reverse order on one of the left wing flap actuator cylinders. The port wing flap was broken into two parts.

This accident was caused by negligence of the maintenance personnel involved. Local CAMIs require that functional checks be completed prior to signing off a completed job. This was not done in this case.

It is recommended that more stringent supervision of all maintenance projects be implemented and that under no circumstances shall established procedures be bypassed in order to expedite completion of work projects, or the signing off of work projects, prior to the completion of functional checks.

Reverse Rigging

2 WRONGS = 1 RIGHT (almost)

2 RIGHTS (almost) = 1 WRONG

It's poor mathematics but it can be done. To see how, let's look at the pitot/static installation in the UF. Fixed metal tubing runs from the pitot tube to a point behind the instrument panel. Two flex hoses are used to connect the fixed tubing to the instruments. These hoses are identical except for painted labels, 'Pitot' and 'Static.' While replacing an instrument a mechanic disconnected and *removed both* of these hoses. When he installed them he used the hose labeled 'Pitot' to connect the static metal tubing to the static instrument inlet. The 'Static' hose was used to connect the pitot tubing to the pitot instrument inlet. Both systems worked properly. The only errors were the two pieces of hose, one labeled 'Static' which was installed in the pitot system, and one labeled 'Pitot' which was installed in the static system. That's the first part of the equation: 2 wrongs = 1 right (almost).

Several weeks later there is a gripe on the windshield wipers. To fix it the mechanic disconnected one end of each of the two flex hoses. He read the labels before he connected the hoses. The hose labeled 'Static' went to the static instrument inlet and the hose labeled 'Pitot' went to the pitot instrumen inlet. Unfortunately, this meant that the pitot tubing was now connected to the static side of the instruments while the static tubing was connected to the pitot side.

Fortunately, the next flight was VFR so the pilot was able to return and land with little difficulty.

How do we fix this? Color coding has been suggested. Frequently it will solve the problem—but not when we draw items from other services and turn items in to other services for overhaul—and not when instruments are interchangeable from one type aircraft to another. To work under these conditions, every plane would have to be color coded, and the other services would also have to use color coded instruments. Maybe we will have color coding one day—with standard colors for inlet and outlet ports—pressure and return lines—and all the other common lines and ports. Standard coding worked out in the same way that we now have coding for oil, gas, and oxygen lines, with the coding applied to the valves, pumps, etc. at the time of manufacture should be possible and should eliminate many Murphys. Until that day, and even after that day, there is still a procedure which should be followed EVERY time.

Whenever you disconnect or remove a line, get out the Maintenance Handbook and find out which way is the right way to hook things back up. Don't rely on memory, it is not good enough. *Even common sense* won't work here. Sometimes a designer has to cross a pair of lines to avoid extra bulk or extra fittings which would cost too much in terms of weight and performance. His common sense tells him that you have a book and will refer tc it when working on these lines. If you rely on your common sense, you will probably uncross the lines and install them in what appears to be the 'right' way. Net result, when the engine starts, the gear folds and you make a belly landing while sitting still. That's if you're 'lucky.' If the control cables are the things in question, the net result can be tragedy.

It's in the book! Use the book every time.—*USCG "Flight Safety Bulletin"* ●

PARABLE, *Flight Line Overtime*

AND so it came to pass that in the 13th hour of the sun, in the land of the burning concrete, that the weary lay down their wrenches and lifted their voices in prayer toward the center cubicle from which all things begin.

And as the benders of the wrenches assemble in prayer, there ariseth great clamor, weeping and lamentation; for they are heavy of eye, sore of feet, and weary of limb, for their toils have indeed been great. Surely, now, the Chief of Maintenance will give them rest. Then there is a great hush, for the hallowed portals of the center cubicle open and the Chief of Maintenance and his disciples come forth from their sanctuary and don their dark glasses and sun helmets; for lo, the sun is painful even unto them.

And a disciple steps forth and speaketh unto them of the 70 percent on the morrow and calleth on the benders of the wrenches to give freely and cheerfully of their labours; for the 70 percent effort surpasseth all things.

And another disciple cometh forth and speaketh in riddles of reports and analysis and of man-hours and of the glories of the system.

Then there is a great hush, for the Chief himself cometh forth to speak and he sayeth unto them, "Return ye to your labours, and, if the 70 percent be a great success, surely on the second Sunday of next week, ye shall have an 'hour of respite.' "

And one of the braver of the benders of the wrenches ariseth and maketh great harangue, and speaketh to the Chief saying, "Surely thou hast not so soon forgotten thy promise that on this day thou wouldst give us rest?"

And the Chief became exceedingly wroth and speakest in a thunderous voice, and the benders of the wrenches whimper and quake in their tracks for their fear is great. For the Chief sayeth, "Be thou then accursed, for thine ingratitude is great." And the benders of the wrenches whimper and murmur. "Yea, verily, we are of the accursed."

And the Chief speaketh yet again, "Hear my judgement, for ye are of the unfortunate. Ye shall henceforth maintain twice as many aircraft. But, we shall give unto you no cotter pins and ye shall forage through the land for new parts. And I shall send my inspectors to work mischief among thy people and to harass and spy upon thee. And great will be the plagues that shall visit upon thee· Yea, verily, thou shalt come to know the torments of the time cards."

And the benders of the wrenches rend their clothing and sit in ashes and plead for mercy, but the Chief is ever unforgiving.

Then the Chief, and his disciples turn away from their place and go thence into the places under which rivers of spirits flow and abide therein during the darken hours.

And the benders of the wrenches return to their tasks and revile the flapped-winged monsters and one sayeth, "Yea, verily, hell is our heritage and we must abide therein."—*2nd MAW*

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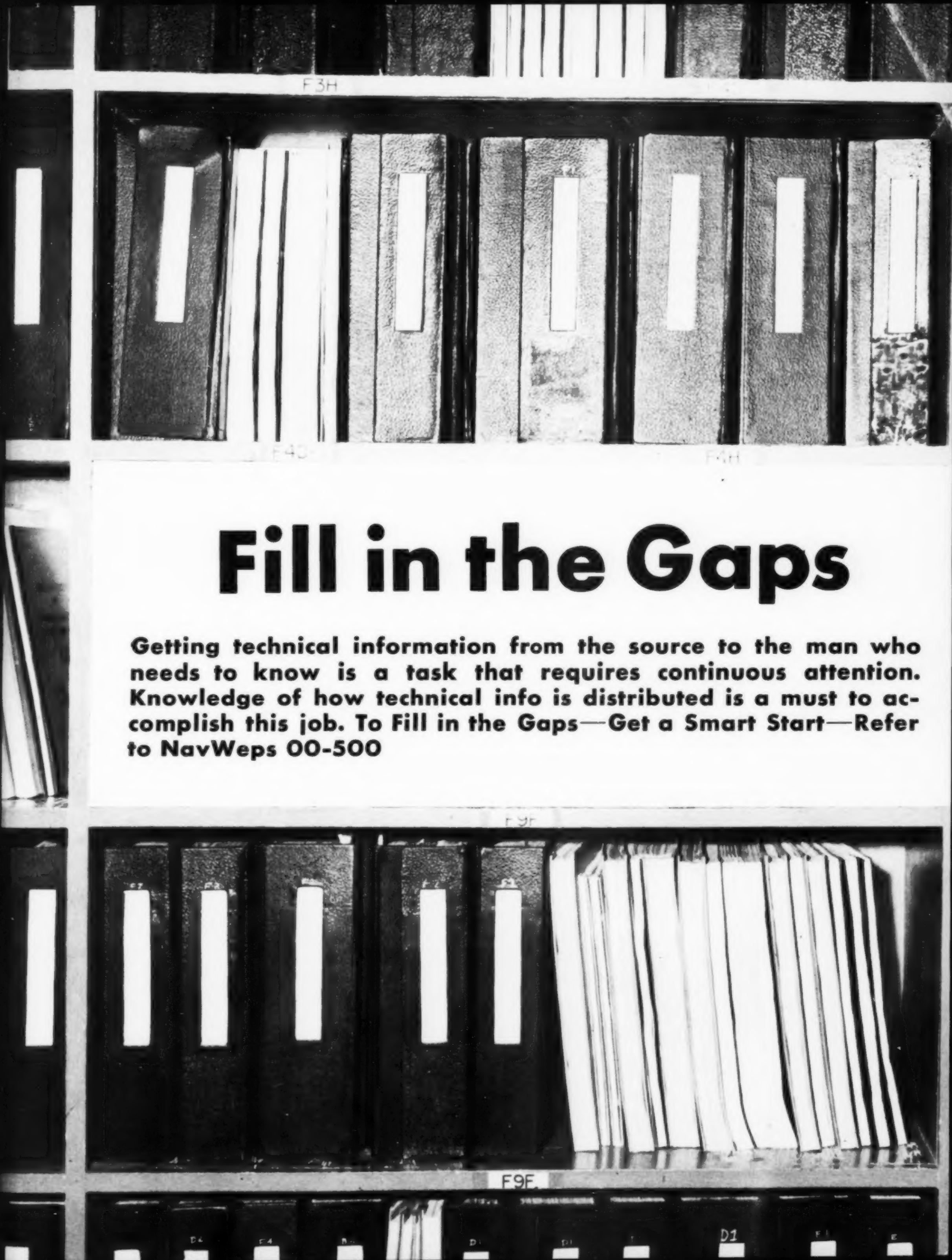
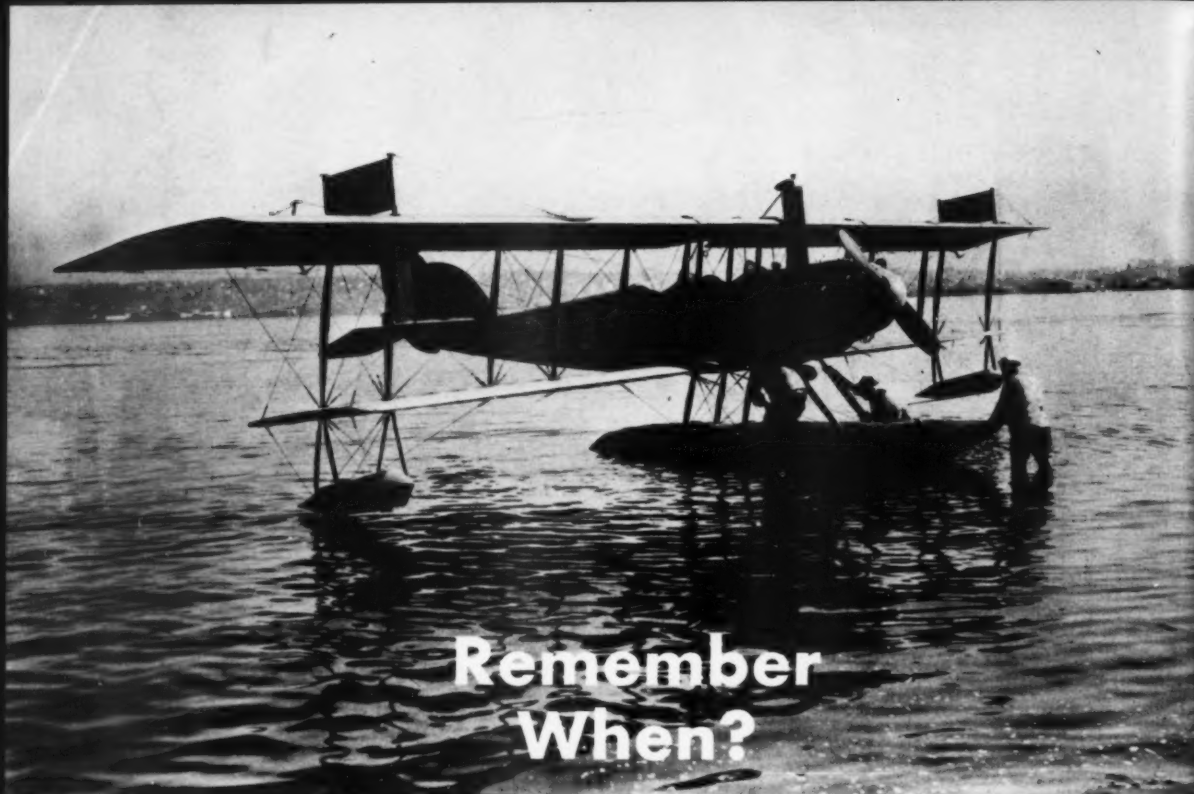


Fill in the Gaps

Getting technical information from the source to the man who needs to know is a task that requires continuous attention. Knowledge of how technical info is distributed is a must to accomplish this job. To Fill in the Gaps—Get a Smart Start—Refer to NavWeps 00-500



Pilot to Rigger.... "Everything all right?"
Rigger .... "All correct, sir." (Remember that "all correct" covers a lot, and it is the rigger's duty to report anything not in perfect condition.)
Pilot to Machinist.. "Everything all right?"
Machinist .... "All correct, sir."
Machinist .... "Switch off?"
Pilot .... "Switch off."
Machinist .... "Gasoline on—air closed?"
Pilot .... "Gasoline on—air closed."
The machinist, now rotates the propeller. (In the case of a rotary engine it must first be doped with gasoline.)
Machinist .... "Contact?"
Pilot .... "Contact."
The machinist now swings the propeller and stands clear.
Pilot .... Looks at Senior Non-Commissioned Officer or Mechanic.
Senior NCO or Mechanic .... Looks to see if all is clear for ascent and no other airplane descending. If all clear he salutes.
Pilot .... Waves hand in a fore and aft direction.
Air Mechanic ...... Stands clear.

The *first* requirement of an airplane mechanic is reliability . . . there must be no guesswork about anything that goes to make up an airplane . . . everything should be right before a machine goes into the air. No good pilot starts a flight until he has tested his motor up to speed and knows that it will give him the necessary power. But the details of the plane, the wire rope and its connections, the eyes, the splicing or other fastenings, the pulleys over which the ropes run, the condition of the rudder and wing hinges and connections, must be taken care of by the mechanics. The failure to know that everything is right may not only mean the life of the pilot but in military matters, the loss of valuable information and the death of hundreds of troops.

Aircraft Mechanics Handbook 1918

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